MECHANICAL HANDLING

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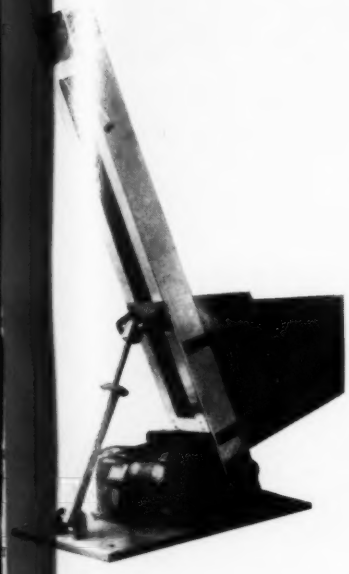

MANAGEMENT'S RESPONSIBILITY

THERE is an element of schizophrenia in many current attitudes to industrial affairs. Whilst acknowledging on the one hand the kind of progress that enables a computer to read 10,000 characters a second, many of us turn a blind eye to the primitive methods of organization and production which still abound in industry even to-day.

This dichotomy can frequently be observed even within a single factory. Very often, the most up-to-date equipment available for one process may be seen cheek by jowl with almost prehistoric methods of carrying out another.

Technological progress daily gathers momentum. Developments follow one upon the other with startling rapidity. So much so that one frequently hears of reluctance to install new equipment on the grounds that by the time the installation is completed, some new development may have made it obsolete.

Sometimes, perhaps, this attitude can be justified; more frequently it cannot. Usually it is merely an excuse for failing to face up to the problems involved. An intelligent appreciation of the likely shape of future progress is an essential part of management's responsibility. Adoption of a negative attitude is to admit defeat. To remain up to date to-day, management must constantly be looking to the future, assessing the trends not only of consumption and demand but also of production techniques, and planning its policy accordingly.

It is true that some instances have been reported of new equipment being installed only to be left idle shortly afterwards owing to a falling off in demand for the factory's products. This is an eventuality that is not always foreseeable, even by the most enlightened management. It is worth remembering, however, that if an industry is passing through a difficult phase, the use of antiquated equipment will not help it to get on its feet again. And the firm with modern plant already installed will be in a better position to meet competition when conditions do improve. In fact, any firm which clearly foresees a difficult time ahead would do well to consider whether the use of improved production and handling plant may not alleviate the very difficulties envisaged.

Also to be considered in a rapidly changing industrial situation is the fact that amortisation periods may need to be much shorter than has hitherto been necessary. Whereas, in the past, it may have been possible to amortise a new piece of equipment over 10 or 20 years, it may now be necessary to write it off within five years or even within one or two years. This factor must be balanced against the savings in operating costs which the equipment is estimated to achieve, and decisions made accordingly.

The principal lesson to be learned to-day is that no industry can stand still; either it advances, or it falls steadily behind in the march of progress. The willingness to investigate new ideas, and to act decisively on the results of such investigations, is now a vitally important part of management's responsibility.

Pour les lecteurs de l'étranger
Für unsere ausländischen Leser
Para los lectores de ultramar

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Automatische Trockenfuttermühle Seite
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In diesem Artikel wird eine Trockenfuttermühle beschreiben, bei welcher

Mahlen, [illegible]Wägen und Mischen mittels Lochkar[illegible] automatisch gesteuert werden.

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Dieser [illegible]kel (als Teil einer Artikelserie über or[illegible]änderliche Förderanlagen und Hebezeu[illegible]oritischer Fabrikation) befasst sich mit [illegible]chinen aus der Fertigung der Fa. R. A[illegible]ister & Co., Ltd.

Material[illegible]s in der Fabrik der Zukunft
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Artikel über Materialfluss und Förderwesen aus Fachscoriften in aller Welt werden in diesem Artikel angeführt und kurz besprochen.

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Informe sobre una demostración de palas, niveladoras y otras combinaciones montadas sobre tractor, presentada por David Brown Construction Equipment, Ltd. Entre otros elementos, se describen una nueva pala frontal y una nueva pala de arrastre hidráulica.

Movimiento rápido de la carga Pág. 106
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Fué organizada recientemente por la British Transport Commission una exposición de equipos para el movimiento más rápido de la carga. El presente Informe pasa revista a los métodos que en dicha exposición fueron demostrados para la manipulación tanto de la carga transportada por carretera como por ferrocarril.

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PACKING AND HANDLING OF MERCHANDISE FOR EXPORT

By a Staff Contributor

THE EXPORT of our industrial products is the most vital necessity for the country's existence. Our standard of living, and in fact our survival, depends on the merchandise we send overseas, and to an equal degree the condition in which it arrives at its final destination.

It is for this reason that good 'export packing' ranks as a very important consideration to-day. It is useless to have good overseas agents, and well-made products despatched from this country, if they are to be received by our customers abroad in an unsatisfactory and unsightly condition.

It is with this object in view—good export packing—that the Bullen Organisation have recently opened at Boreham Wood in Hertfordshire, a new two-storey warehouse costing upwards of £250,000 equipped with the latest equipment, mechanical and otherwise, for carrying out this task. This new warehouse, which occupies a site of 5½ acres and has 250,000 sq. ft. of packing bays, is admirably situated, being a few yards off the A.1 road from London to Scotland, and adjacent to the new Yorkshire motorway, now well under construction. Thus being easily reached from the industrial Midlands and the North, and within easy access to London, Southampton and Bristol Docks.

A few words are necessary about the background of Bullen's. The firm has been in existence for over 50 years, having commenced in a very small way. The business is under the direction of Mr. A. E. Bullen, who is supported by seven young directors in charge of seven departments, each such director being a specialist in his own particular field. The firm has, of course, many activities other than export packing, but this article is dealing with the company's activities in that particular field.

A fleet of over 70 road vehicles is owned by the firm, including low-loading lorries, open trucks, and furniture pantechnicons. This enables the firm to undertake unusual and interesting jobs. For instance, a current venture is the pack which has been developed for the home and overseas transportation of electronic computors. Many such packs have been used with unqualified success for installations of up to £50,000 in value. Some have been for the Continent, and Bullens transported them on their own vehicles to the final point of delivery.

When the company is contracted to handle the export packing of a client's products, a basic procedure is followed which is designed to efficiently control all aspects of the work to be carried out.

Assuming that a piece of machinery is being handled, it is delivered to the Boreham Wood depot either by Bullen's own vehicle or by the manufacturer's transport. When received it is given an identification number, by which it is known throughout the entire process. The machine is then examined with a view to partial dismantling (with the agreement of the makers) in order to reduce the size of the final pack and thus keep the freight charges to a minimum. A study is then made of the weight distribution and also of the apparent weaknesses of construction which would result in damage to the machine if badly handled during its subse-

A section of the packing warehouse. A Lansing Bagnall truck can be seen waiting to be packed for shipment overseas. The overhead electric hoist of 3-ton capacity (Geo. King, Ltd.) is one of many which are installed

A Coventry Climax fork truck lifting a crate to the warehouse on the first floor. This method obviates the necessity for lifts

ABOVE
Another section of the packing warehouse

RIGHT
A section of the warehouse where various types of merchandise are stored and drawn on as required

BELOW
Industrial power trucks waiting for packing in a section of the warehouse

quent journey, and a packing case constructed to meet the individual requirements of the particular piece of equipment in question.

The most suitable method of anti-corrosive treatment is decided upon and carried out in a moisture-free atmosphere. The methods used are many, and often several methods of inhibition and treatment are applied to one piece of machinery, depending upon the nature of its components.

The packing case or crate is then built round the machine, and load distribution bearers fixed into position. The timber used is covered with wax paper to prevent the marring of painted surfaces, and with aluminium laminate to prevent the timber resins from staining machined parts. After weighing and marking, the completed pack is delivered to the dock by Bullen's vehicle. Each pack has been designed to meet the character of the equipment and to contend with climatic and handling conditions to be met *en route*. The company carries out experimental packing at clients' requests, and sell their services at prices which aid the expansion of British exports.

What are the classes of merchandise handled? They are far too numerous to specify here. But when the writer visited Bentham Wood he saw, amongst others, the following items awaiting despatch. Aircraft parts (including wings); engines; diesel engines; pumps; fork lift trucks; and other industrial powered trucks; furniture; antique furniture; emigrants' effects; and radar equipment. Obviously, all these products have to be treated and handled by different methods.

It can be appreciated from this and with a glance at the accompanying illustrations, that mechanical handling equipment plays an important part in the efficient reception of goods and the despatch of the finished packed crate to the docks. At Boreham Wood the company has in use eight fork lift trucks, together with a number of 5-ton capacity 17-ft lift fork lift trucks, in addition to pallet trucks, and a 15-ton capacity Ransomes & Rapier mobile crane. In the packing bay are numerous 3-ton overhead electric hoists.

There are no lifts to the upper storey at Boreham Wood. The crates are picked up by the fork lifts and elevated to an opening in the wall of the first floor. This operation can be seen in one of the accompanying pictures.

Another service to industry offered by the company is that of industrial storage, a service often required by a firm cramped for storage space in their own factory. The goods are collected and taken to the warehouse and raised by the method outlined above, to the first floor, and the maker can draw on them as and when required, either for home trade distribution, or for export packing and shipment.

Shortly to be opened is a further warehouse at Millbrook Road, Southampton, where a pilot plant is now working, and here again mechanical handling equipment plays an important part, with six fork lift trucks and many stillage trucks already in use.

TOP
A Ransomes & Rapier mobile crane lifting a heavy crate for shipment overseas on to a low loader lorry

LEFT
Fork truck handling cartons of television tubes

BELOW
Two lorry loads of computers for shipment to Germany arriving at the docks from Boreham Wood

Mechanical Handling Technical Report on a new side-loading fork lift carrier built in Britain from all-British components

BRITISH-BUILT SIDE-LOADER

BY A STAFF CONTRIBUTOR

As announced in a recent issue of *Mechanical Handling*, Materials Handling Equipment (Great Britain), Ltd., are now building the all-British 'Kestrel' side-loading fork lift carrier, under U.K. Patent No. 723,731, in their Maidenhead works. Most readers will be familiar with the principle of the side-loader, which is intended primarily for stacking and transporting long loads. The lifting forks are carried on a sideways-facing gallows structure mounted centrally on the wheelbase and capable of travelling transversely in a well formed in the chassis between the forward and rear sections of the load-carrying platform.

For picking up and setting down, the gallows is traversed sideways until the fork carriage is well clear of the vehicle and the full length of the forks can be brought under the load. To counteract the sideways turning moment created by the cantilevered load, two hydraulically operated stabilizing jacks are lowered beneath the corners of the well. When forced downward further, against the resistance of the ground, these jacks can be used to tilt the vehicle sideways and prevent material such as bars and tubes from rolling off the forks.

In the travelling position the gallows is retracted and the forks are brought into the well, the load then lying on the deck, supported by the front and rear platforms, and spanning the well, with additional support from the forks if necessary.

Since the side-loader, unlike the fork lift truck, can be drawn up alongside a stack without having to turn into it, the aisle width need be little more than the width of the vehicle, provided wider intersecting aisles are available for turning round.

In developing their new machine Materials Handling Equipment have manifestly been guided by two primary objectives: to incorporate only British-made parts and to take full advantage of the opportunity to benefit from their experience as sole concessionaires for the German 'Irion'—a side-loader manufactured by Albert Irion Nachf., of Stuttgart, which was the subject of a *Mechanical Handling* technical report in our issue of May, 1956, pages 289-294.

This experience goes back over a period of nearly five years, during which time the 'Irion' was modified and improved in several details. In the new M.H.E. 'Kestrel' machine, however, it has been possible to introduce major design changes that could not have been incorporated in an existing product.

More Power

Of first significance among the principal features of the 'Kestrel' is the choice of the Ford 55-b.h.p. diesel engine as the power unit, as against the 30-b.h.p. Mercedes used for the 'Irion'. The increased output has been used to raise the maximum travelling speed from 15 m.p.h. to nearly 20 m.p.h. and to drive a Dowty pump delivering hydraulic fluid at rates of up to 10 gal/min to the lift and traverse rams and the stabilizing jacks.

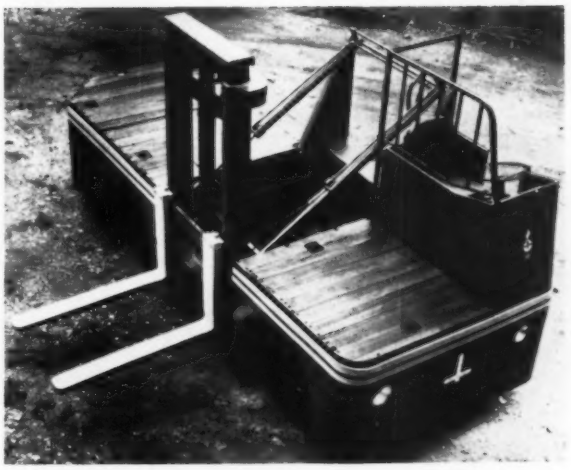

Fig. 1. M.H.E. 'Kestrel' in stacking position with stabilizing jacks lowered and gallows traversed across well

To achieve the higher ratios in the final drive to the road wheels, M.H.E. have employed a three-speed gearbox followed by a transfer gearbox and two-speed Eaton axle. They thereby achieve a forward speed range of 3·5-19 m.p.h. with only three mechanical gear-selections—the high and low axle ratios being selected electrically. This arrangement will be preferred by the majority of drivers to the five-speed gearbox fitted to the 'Irion', and will undoubtedly result in less wear on the clutch and in the box itself.

On the hydraulic side, the increased capacity available has been used by the designers to deliver more oil at a lower pressure and reduce the strain in the system. They have obtained an increase of 50 per cent over the output of 6·6 gal/min available from the Plessey pump of the 'Irion', and this has enabled them to reduce the working pressure by nearly 20 per cent to 2,000 lb/sq. in. and hold a generous safety margin in reserve, while providing a lifting and lowering speed of 40 ft/min.

A large box-section compartment in the rear end of the chassis has been allocated to the accommodation of these large units. No attempt has been made to save space at the expense of accessibility, and the hydraulic and electrical components have been laid out in strict accordance with the principle of making leads and piping as short as possible. As our artist's drawing shows (Fig. 2) the, layout is neat and compact, notwithstanding, and has added only 15 in to the overall length of the vehicle, as compared with that of the 'Irion', and nothing to the width.

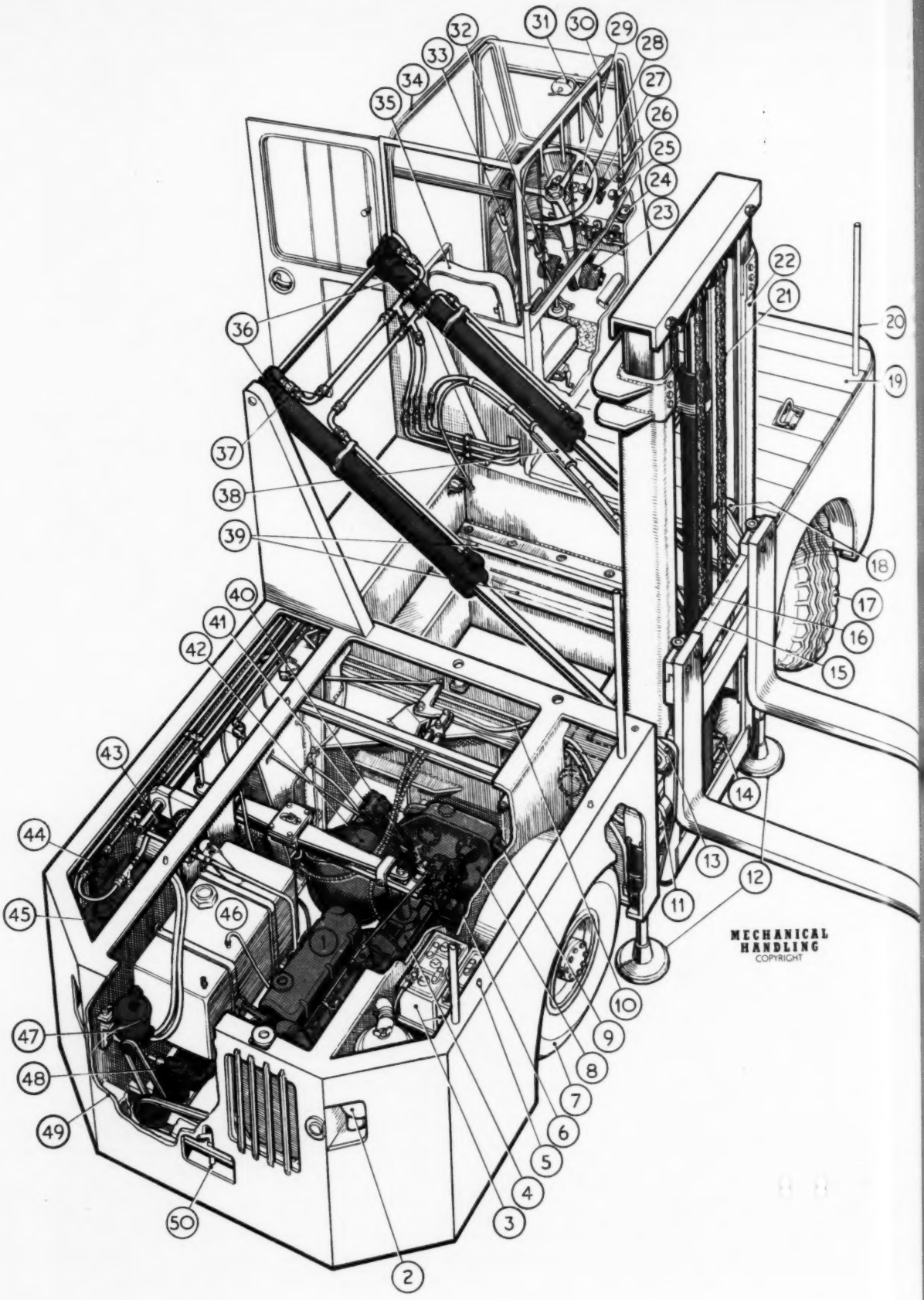
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Fig. 2. Our artist's cutaway representation of the 'Kestrel' 310 with rear loading platform removed to show principal details of engine. This machine is covered by U.K. Patent No. 723,731

KEY
1 [illegible]2 E industrial diesel engine
2 R[illegible]d Lucas rear-light
3 T[illegible]V 115-amp Lucas batteries
4 Fo[illegible]ree-speed gearbox
5 P[illegible]n locating dowels
6 H[illegible]picer couplings
7 D[illegible]14-ply 8·25 × 15 tyres
8 T[illegible]on gearbox to axle
9 L[illegible]ug
10 H[illegible]ic pipes to double-acting stabilizing jacks
11 G[illegible]traverse roller
12 St[illegible]ng jacks
13 To[illegible]t grease nipple on traverse-ram pivot bearing
14 H[illegible]ic piping to flow-control valve
15 Ho[illegible]fork-adjustment pin
16 Sm[illegible]t ram
17 Du[illegible]14-ply 8·25 × 15 tyres
18 Fo[illegible]rriage roller
19 Re[illegible]ble load-carrying platform
20 Lo[illegible]taining stanchion
21 Mu[illegible]k chain for raising and lowering forks
22 Pre[illegible]steel mast
23 Ped[illegible]'Hydrovac' power-assisted four-wheel braking
24 Vac[illegible]gauge
25 Lift[illegible]rol lever
26 Tra[illegible]control lever
27 'Jac[illegible]warning light
28 Stab[illegible]g jacks control lever
29 Remo[illegible]le access panel
30 Fixed[illegible]d guard
31 Luca[illegible]ndscreen wiper
32 Axle[illegible]o selector button
33 Handb[illegible]ke operating on rear wheels
34 Remo[illegible]le Perspex and glass canopy
35 Chapm[illegible] seat adjustable for height, reach, and degree of spring
36 Smith traverse rams
37 Ermeto hydraulic connection
38 Sheathed hydraulic piping
39 Machined rails for traverse rollers
40 Electrically operated two-speed axle gearbox
41 Electric motor
42 Eaton two-speed axle
43 Filter bypass valve
44 Hydraulic fluid filter
45 Hydraulic-fluid reservoir
46 14-gal fuel tank with level-indicator
47 Holborn-Eaton hydraulic pump for power-assisted steering
48 Dowty hydraulic pump for lift and traverse rams and stabilizing jacks
49 Integral pressed-steel welded structure
50 Recessed towing hook

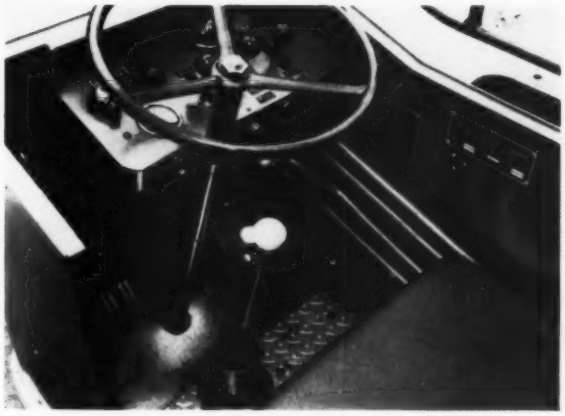

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Fig. 3. Compact grouping of driver's controls results in a roomy cab. Note especially arrangement of hydraulic levers passing through instrument panel. Steering, clutch and footbrake are power-assisted; two-speed axle ratios are selected electrically by means of button on main gear-lever

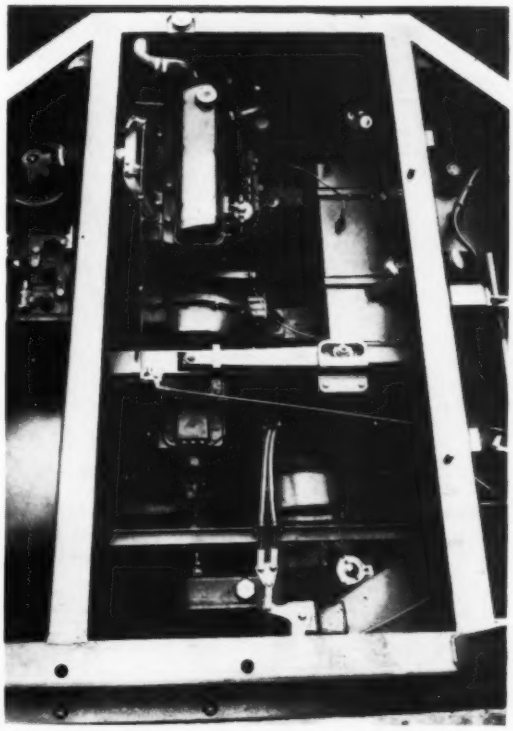

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Fig. 4. View looking down on rear compartment with platform removed. Engine and transmission components are laid out in line and electrical and hydraulic gear is arranged to use short leads

5

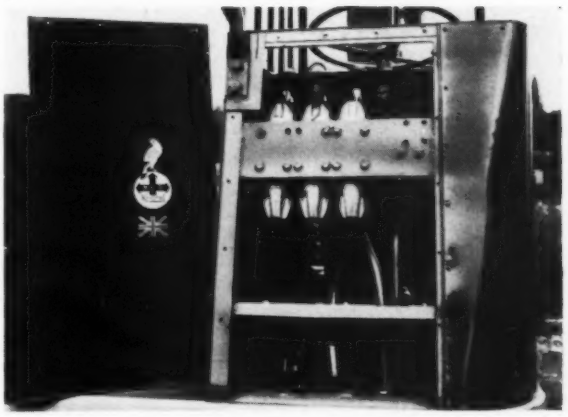


Fig. 5. Access to Dowty control valves, pedal linkages, and instruments, is gained by removing panel at front of cab

No handicap has been incurred, because any potential loss of manœuvrability has been nullified by improving the turning lock, and also by recessing the lamps and towing hook. Excluding these details, the 'Irion' has a turning circle diameter 1 in less than that of the M.H.E. 'Kestrel', but when fully equipped it must yield the advantage to the larger machine.

Handling and Maintenance

Other features of the design are directed toward ease of handling and maintenance. To enable the driver to take full advantage of the vehicle's speed and turning lock, the clutch is hydraulically operated, and steering and brake mechanisms are hydraulically assisted. Grouping of the hand and foot controls is compact, with the levers operating the hydraulic motions projecting through slots in the dash, and this has made the cab both neater and more roomy.

To add to his comfort, the driver has been given a beautifully sprung Chapman seat that can be adjusted to three harness settings. One of his principal worries has been removed by an interlock between horn and clutch, which sets the horn blowing continuously if his foot starts depressing the clutch pedal while the jacks are down and continues to operate until he has removed it. He cannot, therefore, without rousing the neighbourhood, drive off

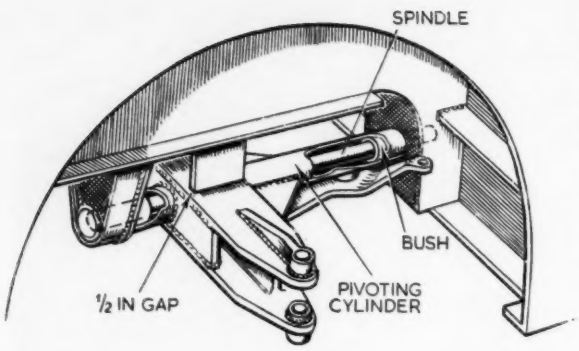


Fig. 6. Detail of front axle central pivot. Gap between axle and stop is sufficient to allow either wheel to be deflected 1½ in, and thus permits a total axle-deflection of 3 in for riding obstructions or hollows

with his stabilizers down. Neither can he, in face of warning lights both on the dash and on the mast, forget to put down the jacks when picking up or setting down a load.

Accessibility of the engine and transmission and the main hydraulic and electrical components has already been noted. As in the 'Irion', they are all reached from above after lifting off the load-carrying platform. In addition in the 'Kestrel' immediate access to the instruments, the hydraulic and electrical controls, and the foot-pedal linkages, is gained by removing a panel at the front of the cab (Fig. 5).

Removal of the major units, also, has been made easier. Radiator, engine, clutch, and gearbox, are mounted independently, and each can be uncoupled and taken away for repair or overhaul without disturbing any of the others. Thus the clutch can be removed for relining while the engine remains in position. The two-speed axle and transfer gearbox can be handled as a sub-assembly, mounted on wheels for easy withdrawal, or as separate units.

Net Gain

In general appearance and in basic construction and performance characteristics the M.H.E. 'Kestrel' follows the 'Irion'. The British machine, though only slightly longer, is a good deal heavier (5 tons 3 cwt *versus* 4 tons 10 cwt), and more powerful. The net effect of the modifications and refinements that have been noted has produced a machine that is faster in operation and easier to handle; being more manœuvrable, less fatiguing, and more fully safeguarded against abuse, than its German predecessor. Running costs are up by about one shilling an hour in terms of fuel consumption, for the smaller Mercedes engine was also a highly economical unit, consuming less than 0·45 lb/b.h.p./hr under full loading. Those incurred in maintenance and repair, however, will certainly be reduced as a result of the 'Kestrel' transmission system. The overall difference in running cost will probably be very small, and will appear insignificant in relation to the increased speed and ease of handling.

General Specification

Of the three M.H.E. 'Kestrel' models now in production at Maidenhead, two are of 6,600-lb lifting capacity, at 24-in load centre, and thus provide a direct basis for comparison with the 'Irion' described in *Mechanical Handling*, May, 1956. They are the 'Kestrel' 310, equipped with a 10-ft mast, and the 313, with a 13-ft mast. A third model, the 410, will raise a load of 8,800 lb to a height of 10 ft. Dimensions and performance data are given in Figs. 10 and 11 and Table I. The following general specification covers all three models.

Structure. The 'Kestrel' is based on an all-welded teel-plate structure comprising a forward and rear section, with a well between, bridged by a rigid box-frame me nber carrying the supports for the traverse rams. The rear se tion forms a large rectangular compartment housing the en gine, transmission, and hydraulic and electrical equipment ; the forward section carries the steering mechanism and th cab and controls. Both sections are covered by qu ickly removable timber decking.

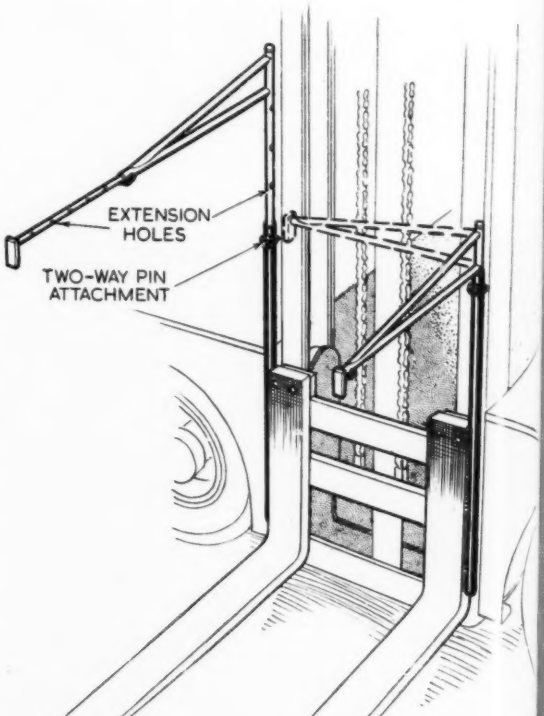
The rigidly braced inner walls of each section for n the sides of the well, on which are mounted the machined t acks for the traverse rollers. The outer corners are strengt ened to support the stabilizing jacks.

Power Unit. Power for driving the roadwheels and hydraulic pump is supplied by a Ford 592 E direct-inj ction diesel engine of 220·35-cu. in. capacity, developing 55 .h.p. at 2,500 r.p.m. Fuel consumption at 1,800 r.p.m., nder three-quarters loading, is at the rate of 0·398 lb/b.h.p. ur.

Transmission. The drive is on the rear wheels and is rans-mitted via a Ford hydraulically operated single-disc dry-plate clutch of 14 in dia to a standard Ford synchr mesh gearbox providing three forward ratios and one re erse. This is followed by a transfer gearbox and an electrically operated Eaton two-speed axle which makes available a choice of high or low ratios in the final drive. Hardy-Spicer couplings are used between the axle and the secondary gearbox, which was manufactured by Opperman Gears, Ltd., to M.H.E. specification.

Gearbox ratios are selected mechanically in the usual manner. Axle ratios are selected electromagnetically by

Fig. 7. Load-clamp attached to fork carriage. Each arm is adjustable for height and span and can be folded back, as shown by dotted lines, when not in use



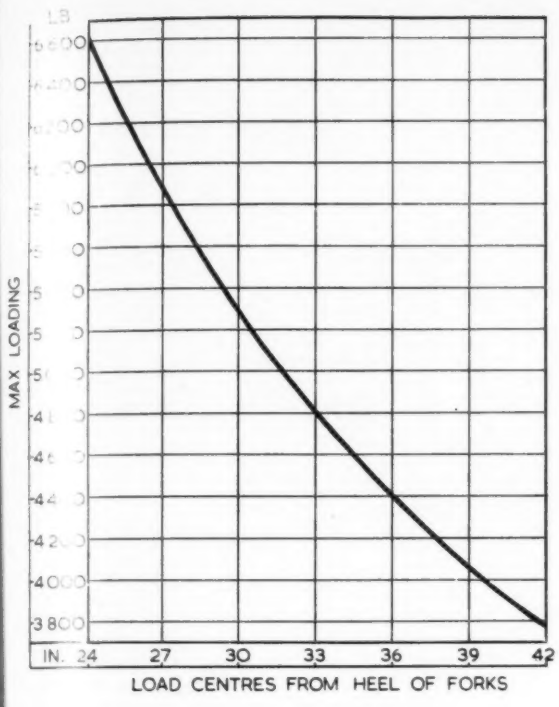


Fig. 8. Loading curve for 'Kestrel' at 10-ft lift height

means of a switch mounted on the gear-selector lever. High or low axle ratios can be engaged while the truck is travelling, and the changes can be made in sequence with those of the gearbox to obtain close-ratio stages through the combined range of six forward speeds and two reverse. Alternatively, the system can be regarded and used as a three-speed gearbox with high or low axle setting. Maximum speeds available at each stage are given under *Performance Data*.

Steering and Articulation. Steering is on the front wheels through orthodox Ackerman-type linkages to a Bishop steering gear by Cam Gears, Luton. Power-assistance is provided by a 'Hydrosteer' hydraulic system with a Holborn-Eaton pump.

The front axle is welded to form a deep channel-section beam, which is centrally pivoted to permit articulation. Each of the front wheels can be deflected vertically 1½ in before the axle encounters steel stops welded to the frame. This arrangement enables the vehicle to ride 3-in projections or potholes without tilting and to ride over rough ground without losing tractive effort, while maintaining the rigidity necessary for side-loading operations.

Brakes. Girling brakes on all four wheels are foot operated with Clayton Dewandre 'Hydrovac' vacuum assistance and provide an effective frictional area of 135 sq. in on each drum. The handbrake operates on the rear wheels only.

Wheels and Tyres. Disc wheels, with 6·50-in × 15-in rims, are fitted with Dunlop 8·25-in × 15-in heavy-duty pneumatic tyres pumped to 100-lb pressure.

Gallows and Fork Assembly. The fixed and sliding members of the gallows are of channel-section pressed steel. The fork carriage is fitted with two pairs of rollers running in grease-packed ball-bearings and is raised and lowered by two multi-link chains in synchronism with the movement of the inner frame. This is effected by a single hydraulic ram thrusting against the crosshead.

The gallows structure is mounted on rollers running between the machined ways in the well, and is traversed by means of two inclined hydraulic rams pivotally mounted on the bridge section of the main frame. Side-thrust exerted when the gallows are fully extended is taken by hydraulic stabilizing jacks at each outer corner of the well.

Hydraulics. The Smith single-acting lift ram and double-acting traverse rams and stabilizing jacks are supplied with pressurized hydraulic fluid by a Dowty pump belt-driven from the engine flywheel. The oil circulates through a closed system at a working pressure of 2,000 lb/sq. in. The pump is capable of delivering 10 gal of oil a minute at a maximum pressure of 2,500 lb/sq. in. and the system is protected by a preset relief valve. Ermeto standard connections are used throughout.

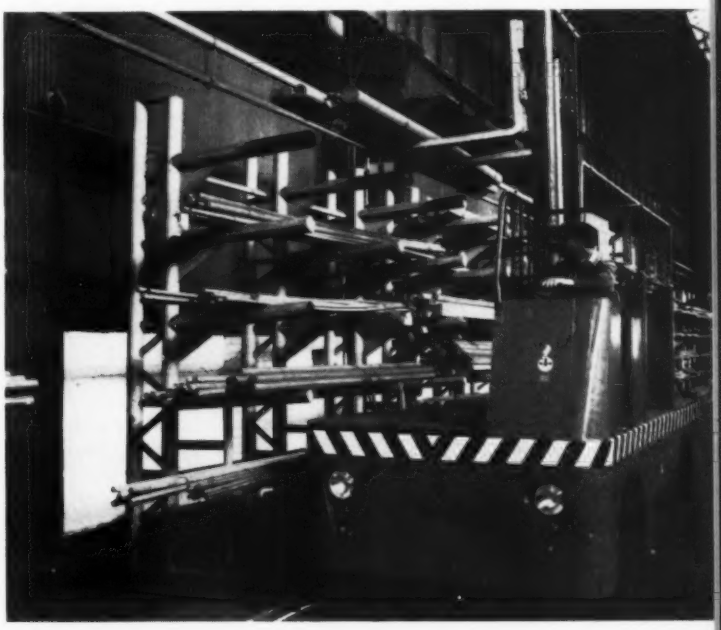
Movements are controlled from the driver's cabin through Dowty slide-valves mounted behind the removable front panel. A flow-control valve on the outlet from the lift ram prevents the load from dropping suddenly in the event of a pressure failure on the system.

Electrics. Current for the engine-ignition, lighting, and signalling systems, and for the windscreen-wiper motor and axle-gear selector, is stored in two 6-V 115-amp Lucas batteries. The vehicle is equipped with full automotive lighting equipment, including recessed Lucas headlamps, side and rear lamps, and flashers, and with electrically operated windscreen wipers and horn.

Warning lamps mounted on mast and dash panel are switched on if the gallows is traversed with the stabilizing jacks in the raised position. A switch operated by the clutch pedal makes the horn blow continuously if pressure is applied to the clutch when the jacks are down. Selection of high or low axle ratios is effected by a pushbutton switch mounted on the main gearbox selector lever, which actuates electromagnetic controls in the secondary gearbox.

Driver's Cabin and Controls. The cab is an open steel-sided superstructure on the nearside of the front platform.

Fig. 9. 'Kestrel' at work in bar mill warehouse at River Don works of English Steel Corporation, Ltd.



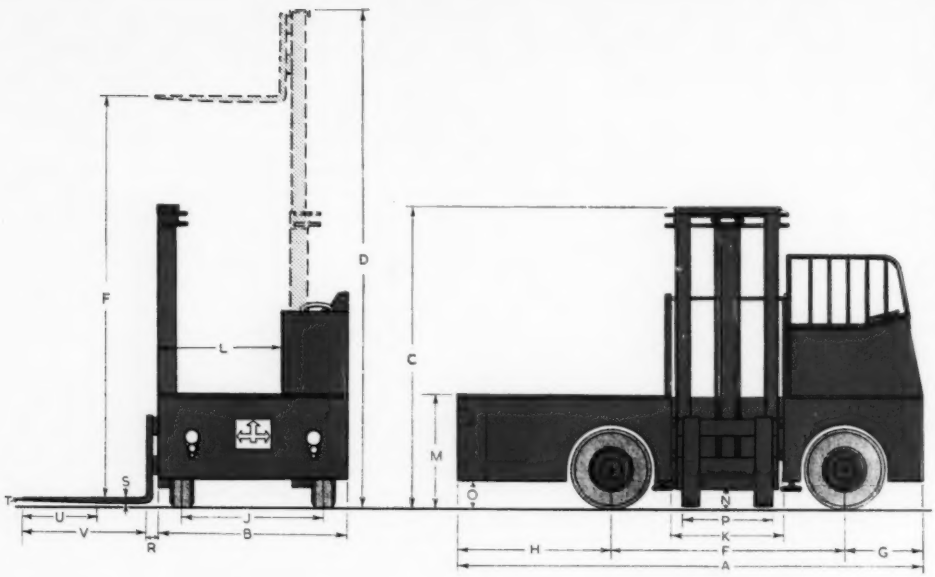


Fig. 10. Principal dimensions of 'Kestrel' 310, 313 and 410:

A Overall length, 180 in
B Overall width, 73 in
C Overall height, mast lowered (313 and 410), 116 in; (310), 98 in
D Overall height, mast fully raised (313), 194 in; (410) 164 in; (310), 158 in
E Maximum lift (313), 156 in; (310 and 410), 120 in
F Wheelbase, 91 in
G Front overhang, 31 in
H Rear overhang, 58 in
J Track, 55 in
K Width of well, 44 in
L Effective width of platform, 48 in
M Height of platform, 4 in
N Ground clearance at lowest point, 8 in
O Ground clearance at rear, 11 in
P Fork spread (minimum), 12 in; (maximum), 39 in
R Maximum clearance between body and heel of fork, 3 in
S Maximum fork depth, 2 in
T Minimum fork depth, 0·75 in
U Length of taper, 30 in
V Length of standard fork, 48 in

A removable coach-built upper section, of glass and Perspex, is available as an optional extra. All controls, including the three levers for the lift, traverse, and stabilizer motions, are grouped in front of the driver and are accessible on removal of a panel forming the front wall of the cab. Brake, clutch, and accelerator pedals, gear-selector lever—with electric selector-button—and handbrake, the three hydraulic control levers passing through the dash panel, the ignition and light switches, and the starter button, comprise the driver-operated controls. Speedometer, switches, warning lights, and horn button, are mounted on the face and edge of the dash panel.

The driver is provided with a Chapman sprung seat adjustable vertically and horizontally and provided with three settings regulating the resilience of the springing.

Attachments and Accessories. A crane attachment, with a lifting capacity of 6,600 lb at 24-in load centre, is available for use with the 310 and 313 'Kestrel' models, and with an 8,800-lb lifting capacity at 24-in for use with model 410.

Another useful attachment, designed for retaining loose loads, such as small timber telegraph poles, tubes and pipes, or round steel sections, is the adjustable clamp illustrated in Fig. 7. A pair of these tubular units, fitted to the sides of the fork carriage, moves up and down with the forks and is adjustable for height and reach. When not in use, each arm can be swung sideways and folded and locked across the breast of the gallows in a position in which it cannot interfere with loading operations.

Other additional equipment includes a two-way radio-telephone system, which allows the vehicles to be directed from a remote-control centre, and an oxy-catalyst exhaust muffler that renders the exhaust gases innocuous.

Performance

The 'Kestrel' was seen at work in the bar mill warehouse of the English Steel Corporation, Ltd., Sheffield, as reported in *Mechanical Handling*, December, 1958, pages 814-818. 'Kestrels' are being supplied in this country to British Railways, Glasgow Corporation, and companies in the steel, timber, and concrete industries, and to several countries oversea—for example, to the Australian timber industry, oil refineries in Trinidad, the Indian aircraft industry, engineering works in Finland, and the Italian motor industry.

Performance data are given in Table I and in the loading curve Fig. 8. Turning radii and space requirements are shown in Figs. 10 and 11.

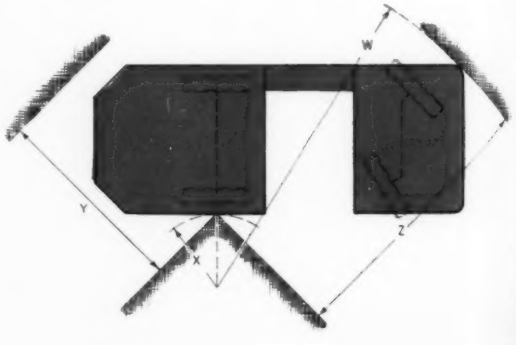


Fig. 11. Space requirements. These are minimum dimensions to which working allowances must be added

W Outside turning radius, 162 in
X Inside turning radius, 36 in
Y Width of aisle, 96 in
Z Width of intersecting aisle, 134 in

Table I. Performance data for 'Kestrel' 310, 313 and 410

Lifting and lowering speeds		40 ft/min	average
Time taken for full traverse			6 sec
Time taken to raise or lower stabilizing jacks			3 sec
Maximum travelling speeds, m.p.h.:		*High axle ratio*	*Low axle ratio*
Forward	1st gear	5·0	7·5
	2nd gear	10·0	15·5
	3rd gear	19·0	31·0
Reverse		4·5	7·0
Maximum gradient, under full load			1 in 7
Maximum pulling power		5-ton brake	d trailer
Weight, unladen, approximate:			
410			1,600 lb
310 and 313			1,500 lb

Describing steel band conveyors working at the Letchworth Bacon Company's factory

CONVEYORS INCREASE BACON PRODUCTION

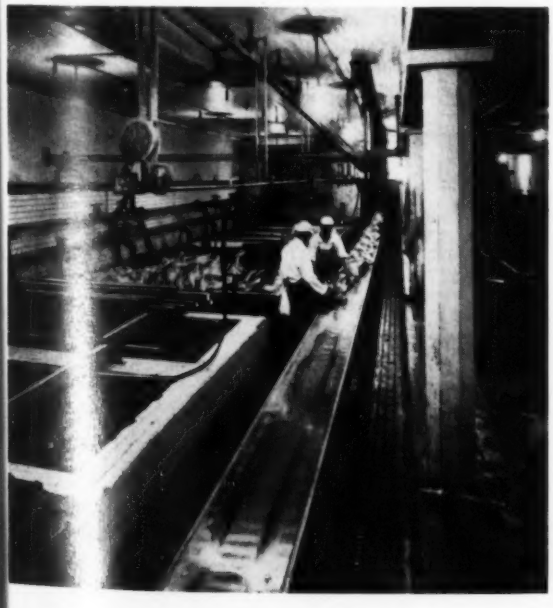
The success of the productivity drive for more pigs has naturally led to problems of how to handle the increased production in the slaughter house and bacon curing plants. Not only are the pig breeders trying to find new ways and methods of improving the pig but the curers are also seeking improved methods of handling the sides.

A major problem at the Letchworth Bacon Company's factory at Letchworth in Hertfordshire was how to handle more sides per day in the space available. The main factor that limited an increase in production was the transporting of sides by truck and roller track through the trimming room and from the chilling room to the curing tanks and after curing to the maturing store. This method involved a great deal of manual labour. Therefore, it was decided to replace the truck and roller track method with stainless steel band conveyors (supplied and installed by Sandvik Steel Band Conveyors, Ltd.). After installation of the new system, the production rate in the cutting department went up 40 per cent and over 100 per cent in the curing department, using the same labour force. This naturally has led to greater efficiency and the curing vats can now work to full capacity.

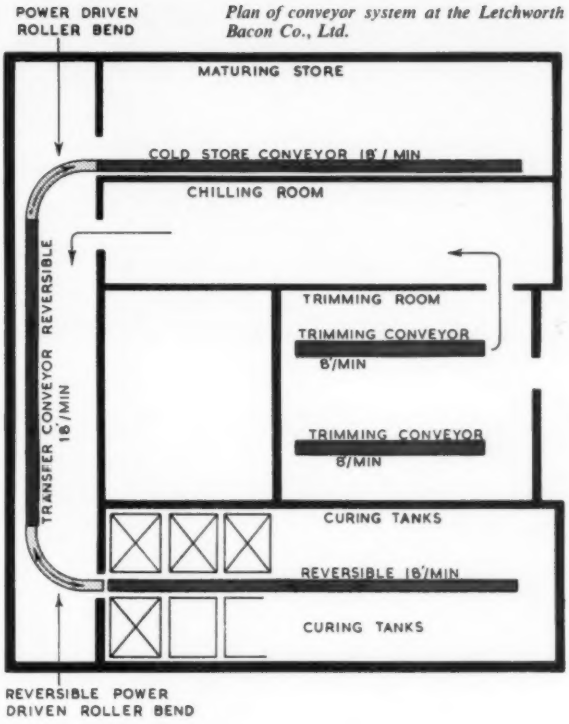
The pigs on delivery from the farms are housed in pens adjacent to the slaughter house into which they are moved in batches as required. Here they are stunned, by passing a light electric current across their brains, and immediately they are slung from one of the hind legs on to an overhead rail which carries them forward for sticking and bleeding.

The carcases are then fed into a scalding tank and from there, are hooked on to an overhead conveyor; both types of carcase go into the de-hairing unit. Pigs now going for bacon, pass through a singeing furnace which burns the skin and tenderizes the rind; pigs for pork by-pass this process.

The reversible steel band conveyor in the curing room



Plan of conveyor system at the Letchworth Bacon Co., Ltd.



After scraping, the pigs are slit down the belly; the gut, intestines and stomach, etc., are removed and the sides split into two. They are then inspected against disease, weighed and graded. The Letchworth Bacon Co. have 13 different grades, but approximately 60 per cent of the pigs are in the top grade. The average size of the sides is 4 ft 2 in long by 14 in wide and they weigh approximately 60 lb.

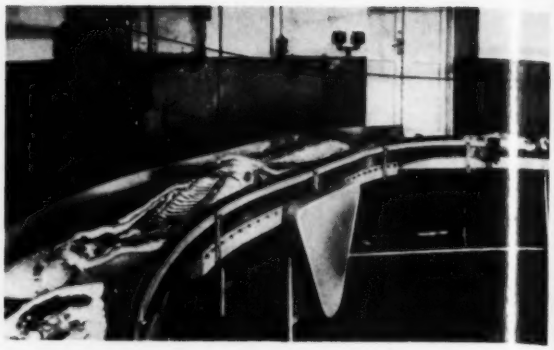
The next process is the trimming room. Up to this point the sides are carried on an overhead rail and are suspended from their remaining hind leg. From this stage, conveyor belts are used right through to the curing process and finally into the cold store, except for the chilling room where they wait their turn prior to despatch to the brine curing room.

In the trimming room two Sandvik stainless steel conveyors are installed, each one measuring 32 ft between centres and they run at a speed of 8 ft per min. Here the operators work alongside the conveyors where various trimmings of fat, gristle and bone are removed; the blade bone is extracted and the chine bone sawed and trimmed according to the Wiltshire cut. The sides are now transferred to the chilling room prior to being cured.

When ready for curing, they are placed on a transfer steel band conveyor—53 ft 6 in between centres—where the hind leg is removed and the sides carried to the curing room; they are then transferred by a power-driven right-angle roller bend on to another stainless steel band running down the centre of the curing room with the curing vats either side. This conveyor is 79 ft long between centres. At the entrance to the curing room each side is injected with a mixture of brine and saltpetre using a stainless steel needle. The sides are then stacked by hand in the curing vats. In all, there are 21 vats, each vat taking up to 250 sides.

After a curing period of approximately five days, the brine is pumped out of the vats and the sides are then loaded on to

This photograph shows the Sandvik conveyor in the cold store



Reversible power-driven roller bend connecting the transfer conveyor to the reversible conveyor in the curing room

the same conveyor. In this case, the conveyor is reversed and the sides are transferred to the maturing store. Operators working in this department remove the sides from the conveyor and stock them according to grade on pallets where they remain for maturing periods of 10-14 days. The length of the conveyor in the maturing store is 79 ft.

The green or unsmoked sides are then baled for despatch or transported by fork lift truck for smoking where they hang for 48 hours, the smoke being provided by smouldering oak sawdust.

The conveyor that operates in the curing room and travels up the maturing store, is the reversible section with a power-driven roller bend, which is also two-way. The conveyor in the maturing store only moves in the one direction, that is, into the store. The whole system has a speed of 18 ft/min; the bands are of cold hard rolled stainless steel, 16 in wide × 0·024 in thick and are of the new Sandvik Tru-Track design. The conveyor bands have two vee ropes bonded to their underside which ensures continuous tracking. The conveyor structure is of tubular construction to ensure cleanliness and is aluminium plated to a depth of 0·006 in to protect it from corrosion, also the stainless steel conveyor bands are easy to keep clean.

To cater for future increases in production, the conveyor system has been designed to handle a maximum of 400 sides per hour.

SCREENING PLANTS SUPPLY ATOM PROJECT

TWO WASHING and screening plants working for the Warmwell Sand and Gravel Pits, of Warmwell, Dorset, are turning out all of the sand and gravel being used in the construction of the United Kingdom Atomic Energy Authority's 'second Harwell' at nearby Winfrith.

Both plants, supplied by Frederick Parker, Ltd., of Leicester, are working at full capacity producing 7,800 tons of material a week and the management estimates the plants will be kept busy by the Winfrith project for four years at least, and probably longer.

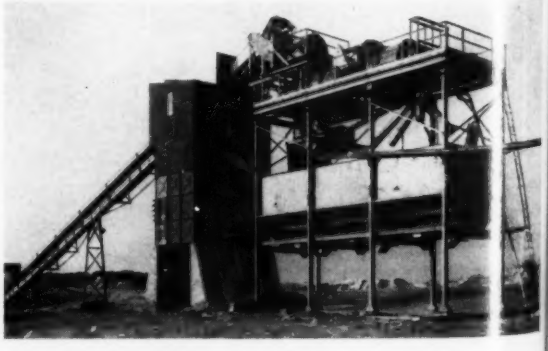
The first of the Warmwell plants was installed in 1949; the second began production recently. The new plant was ordered to cope with the demand created by the Winfrith project.

The new plant installed by Parker's consists of a 6-ft-long 'Uniflow' washer and screen which separates sand and the +1¾-in rejects; and a No. 6 'Contraflow' washer with screens to separate sand, + $\frac{3}{16}$in, +$\frac{3}{8}$ in, +$\frac{1}{2}$ in and +$\frac{3}{4}$. Sand from both washers is dewatered by a Parker No. 2 cone dewaterer before being discharged into a storage hopper.

The plant is a duplicate of the one installed in 1949, except that it has no 'Kubit' crushing unit. Storage capacity of the bins on the plant is 195 tons.

The Atomic Energy Establishment at Winfrith is being constructed to meet the United Kingdom Atomic Energy Authority need for a 'second Harwell'. It was conceived against the broad background of Britain's nuclear power programme set out in the White Paper of 1955 (Cmd. 9389) and is being planned initially as an experimental station concerned with nuclear reactors in the pre-prototype stage, including pilot assemblies and associated line of laboratory and workshop activity.

The latest washing and screening plant installed at Warmwell Sand and Gravel Pits by Frederick Parker, Ltd.



By J. A. [illegible]UCK

AU[illegible]OMATIC PROVENDER MILL

Grin[illegible]g, blending and mixing is achieved automatically under [illegible]unched card control, at th[illegible] Beverley Mill of Barkers & Lee Smith, Ltd.

AUT[illegible]ATION is a word that has been misused so much recently that one now hesitates to sanction its further usage without good cause. Nevertheless, it would be difficult to find a more suitable term to describe adequately the exceptional degree of automatic operation and control built into the new provender mill of Barkers & Lee Smith, Ltd., of Beverley, Yorkshire.

Intake and storage of raw materials, grinding and blending to any prescribed formula, mixing, cubing, pelleting, etc., and the feeding of finished products into weighing and sacking-off equipment are all achieved automatically. There are two control panels (housed in a central control room) both incorporating mimic flow diagrams, one for the intake and silo plant, the other for the grinding, blending and mixing operations. The final process plant (cubing, pelleting, etc.) is independently controlled.

The new plant has been installed in an old building formerly used by the company for the extraction of oil from imported oil seeds. This side of the company's activities has now been transferred to other mills at Hull and Lincoln, leaving the Beverley mill free to concentrate on provender milling.

A tremendous variety of different animal feeding stuffs are produced to varying formulae, calling for great accuracy and flexibility in the blending equipment. Punched cards are used to control the blending and mixing operations, and enable raw materials to be automatically proportioned by weight in any amount from 7 lb to 2 tons. The entire scheme was planned by Mr. J. C. Barker, director and works manager of Barkers & Lee Smith, Ltd., together with the late Mr. Morrisse Lilley, at that time a director of W. S. Barron & Son, Ltd., who made the plant, along with Dunford & Elliott (Sheffield), Ltd., who were responsible for the design and manufacture of the automatic control gear and weighing equipment.

ABOVE
Fig. 1. Intake of grain from barge via an existing Strachan and Henshaw bucket elevator

LEFT
Fig. 2. Cyclones and fans associated with the two rubble separators

The complexity of the plant is such that, to simplify description, it will be best to consider the installation in four separate sections, as follows: (1) the intake and silo plant; (2) the grinding plant; (3) the automatic blending plant; and (4) the processing and sacking-off plant.

1. Intake and Silo Plant

The primary raw materials of provender milling include barley, wheat, oats, maize and other cereals. The new plant

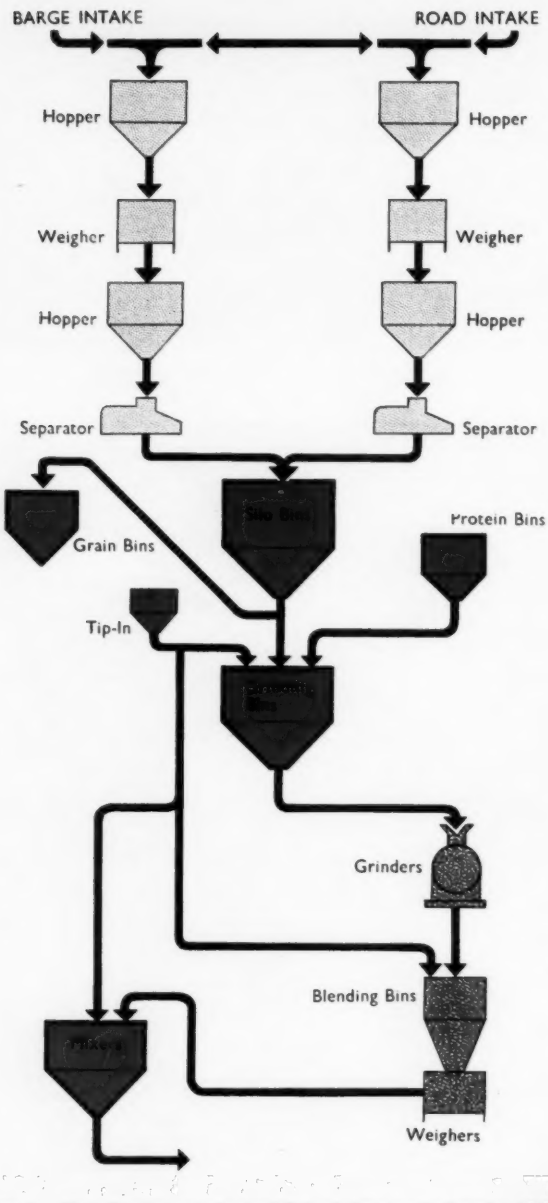


Fig. 3. Flow diagram, greatly simplified, of plant at the Beverley Mill

is able to take delivery of the various grains, in numerous different grades, by barge or by road, in bag or in bulk. A simplified flow diagram of the plant is given in Fig. 3.

The building is situated alongside a non-tidal beck which provides access to the mill from the River Hull. An existing bucket elevator is lowered into the 100-ton barges and discharges bulk grain into the intake of the new system (Fig. 1). For bulk-delivery by road vehicles, three intake hoppers are provided on the opposite side of the silo building.

Bagged materials can be delivered either by barge or by road, and can be fed through tip-ins to the grinders, blending bins, or direct to the mixers.

Incoming grain from barges is discharged by the existing bucket elevator into a 12-in bucket elevator forming part of the new system. This elevator discharges into a pair of hoppers forming the first stage of two independent cle ning, or separating, plants which remove rubble and other unwanted material.

The two cleaning plants are arranged so that bo h can receive grain either from barges or from road vehic s. If required, one plant can be receiving material fro road vehicles while the other is receiving grain from barge both plants operating simultaneously. Total intake capacit from the two sources is 50 tons per hour.

In the case of road vehicles, the three intake h ppers discharge, via spouting, into two horizontal 8-in chain conveyors in such a way that any of the hoppers ca feed either of the conveyors. If necessary, two intake h ppers can be employed to feed both chain conveyors simultaneously.

The chain conveyors each discharge into separat 12-in bucket elevators which feed the cleaning plant hop ers in the same way that incoming grain from barges is fed to the hoppers by another elevator, as previously described

The hoppers themselves discharge into two aut matic weighers which, in turn, feed into two final hoppers erving two 24-in Apex rubble separators. By-pass spou ing is provided so that grain can be fed from barge or road ehicle direct to the separators without being weighed, o even by-pass the separating plant completely if required.

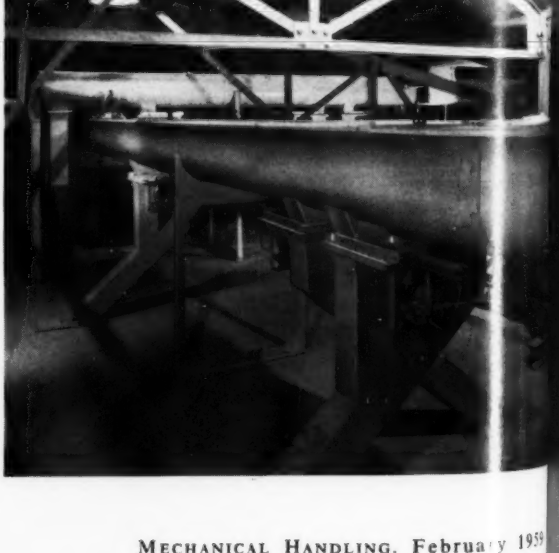
From the separators material is discharged into either of two 12-in bucket elevators which raise the grain some 56 ft and then discharge into either of two 12-in horizontal worm conveyors running along the top of the first group of silos.

The silo bins are arranged in an 'L' formation, with the first group of 12 58-ton capacity bins in a double bank of six on the long arm of the 'L' and a second group of eight bins, each of 63 tons capacity, in a double bank of four on the short arm. The capacities mentioned are for wheat and naturally vary for other grains according to density.

The worm conveyors, mentioned above, feed the first group of 12 bins, and then beyond to two secondary 12-in worm conveyors, branching off at right angles and serving the eight larger bins (Fig. 4).

If it is desired to by-pass the silos, material can be fed direct from the intake or separating plant to a 12-in bucket elevator discharging into a high-level worm conveyor which, as will be seen later, takes material to the mill.

Fig. 4. View of the worm conveyors feeding the eight large silo bins. In background is seen one of the two conveyors feeding the 12 medium silo bins which run at right angles to the larger bins



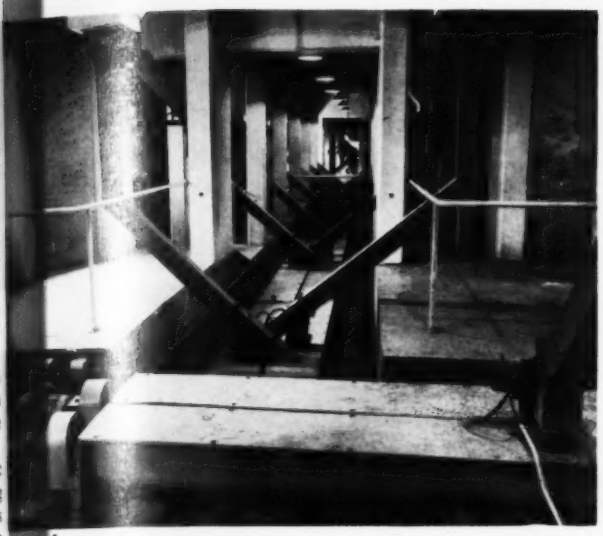


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Fig. 5. View beneath the 12 *medium silo bins, showing spouting discharging into the two worm conveyors. The discharge ends of the worm conveyors bringing material from the eight large silo bins are seen in the foreground*

Fig. 6. Control panel for the silo plant

Fig. 7. Main control panel for the grinding, blending and mixing plant

The silo building itself has been adapted from the old oil seed storage building. Existing floors were removed and the interior of the building piled to support the erection of the 20 reinforced concrete bins, the aggregate capacity of which is approximately 1,000 tons. Only a few inches clearance exists between the walls of the building and the sides of the 32-ft high silo bins.

The routes for the various incoming materials are selected by means of multi-position switches mounted on the silo control panel in the central control room (Fig. 6).

2. Grinding Plant

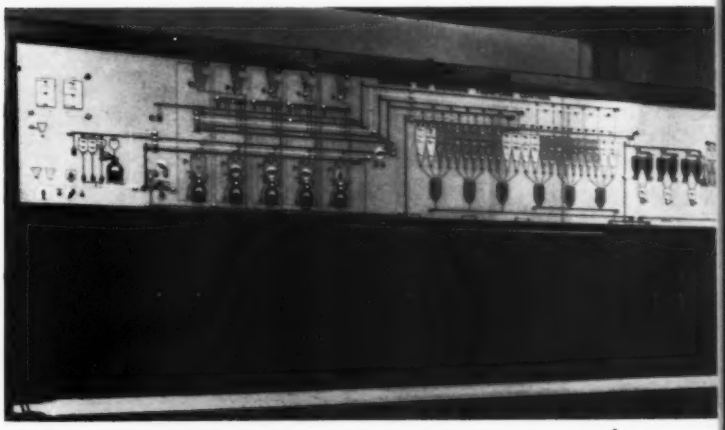
Fully automatic routing is achieved on the intake to the grinding plant and at all subsequent stages of processing until the mixed materials arrive at the independently controlled cubing and pelleting plant. Destination switches are set to the desired position on the control panel (Fig. 7), and, from then on, the control gear automatically finds the correct route for the materials. If one section of the conveying system is already conveying materials for another operation, the equipment automatically selects an alternative path.

When required for grinding, material from the eight larger silo bins is discharged into either of two 12-in worm conveyors. These feed into two other worm conveyors which also receive material, as required, direct from the 12 medium bins (Fig. 5). Remotely controlled, pneumatically operated slide valves at the outlets of the silo bins regulate the feed to the conveyors.

The worm conveyors discharge into two 12-in bucket elevators which take the material, via the previously mentioned high-level 12-in worm conveyor, to the mill. The bucket elevators are the same ones that are used for taking incoming material to the worm conveyors at the top of the silo, the required direction in any instance being selected by automatic dampers.

The high-level worm conveyor feeds from the silo building to the grinding plant. It discharges into a further 12-in worm conveyor, which runs above, and feeds into, the five grinding bins. The latter conveyor also discharges into a series of grain bins which permit grain to be sacked off for resale. The grinding bins may also be fed by two other worm conveyors which receive material from two screw-lift elevators. One of these elevators receives material from two 24-ton capacity protein bins, while the other is fed direct from two tip-in hoppers for the intake of bagged materials. The same tip-ins can be used to feed direct to two other screw-lift machines, which elevate material to the blending bins, thus enabling bagged material to by-pass the grinding process.

The five grinding bins each discharge into separate grinders (Fig. 8), of which there are three Barron No. 5 impact grinders and two Barron No. 3 D-type impact grinders, the latter two operating in tandem, making four effective grinding units in all. After settling out in primary and secondary high-velocity cyclones, the ground material drops into four 8-in dia worm conveyors. These, in turn, feed six 9-in screw-lift elevators (Fig. 9), which discharge respectively into six 10-in dia worm conveyors (Fig. 10).



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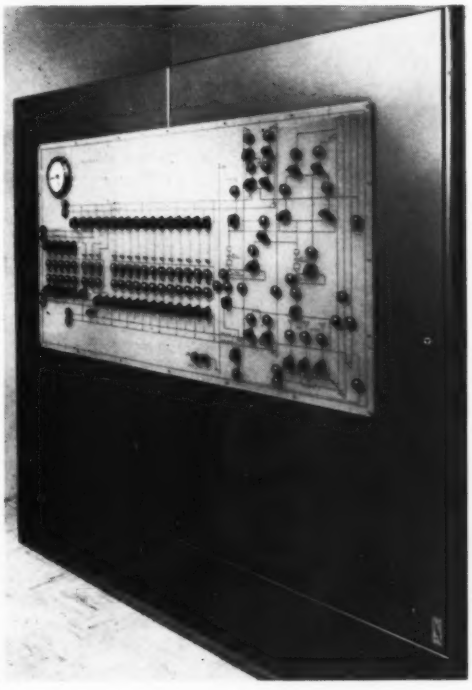

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Fig. 8. View of the grinder house showing Barron impact grinders

Fig. 9. Screw-lift elevators feeding material from grinding plant to blending plant

Fig. 10. Top floor of blending house, showing worm conveyors feeding the blending bins

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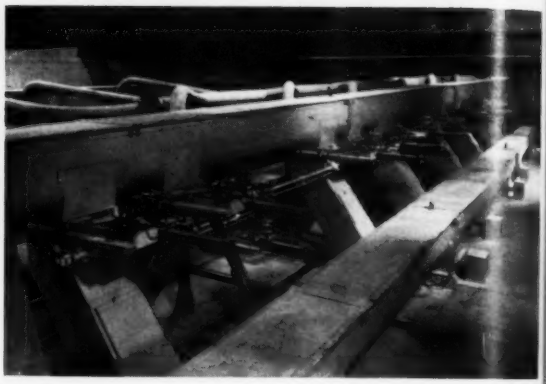

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feeding the blending bins. In addition, material from the cyclones can be dropped into an 8-in dia worm conveyor for conveyance to a sacking-off point when ground products are required for sale.

3. Automatic Blending Plant

There are 24 blending bins in all. Each bin has two alternative inlets from two of the six 10-in dia worm conveyors bringing material from the grinding plant. The bins are arranged in four banks of six which, in turn, are grouped together so that their outlets are arranged in six groups of four.

Positioned beneath the six nests of bin outlets are six automatic weighers. These were built by Dunford & Elliott (Sheffield), Ltd., on sub-contract from W. S. Barron & Son, Ltd., and to the very special requirements laid down by Barkers & Lee Smith, Ltd. In operation, the weighers give a degree of flexibility, accuracy, and automatic control, which, it is believed, is unequalled elsewhere.

The automatic weighers (Figs. 11, 12 and 13) enable material from any blending bin to be weighed out in increments of 7 lb up to a maximum of 2 cwt. When greater quantities are required from any one bin, the appropriate weigher automatically makes up the required amount by means of multiple weighings. For example, if 19 cwt 14 lb of a given material is required, the weigher will draw off from the blending bin nine weighments of 2 cwt each followed by a single weighment of 1 cwt 14 lb.

As has been described, each weigher serves four blending bins, and when material from more than one of these bins is needed for any given formula, the weigher automatically takes the required quantities from each of the four bins in turn.

Operation of the weighers and of the slide valves of the blending bin outlets is achieved automatically by punched card control. Large cards of approximately 10 in × 8 in are used. Provision is made for the punching of 24 rows of holes by means of a hand punch. The cards are inserted in a reading device mounted on the central control desk (which is remotely situated from the blending plant). All the information necessary for the completion of any given formula can be punched into the card, which then provides the means for the automatic charging of the weighing machines, the weighing of the correct quantities of materials, the conveyance of these materials to the mixing plant, and control of the actual mixing operation.

The slide valves in the blending bin outlets are pneumatically operated, by a servo-mechanism, and control the rate of feed into the weighers (Fig. 14). At the beginning of each weighing operation there is a full feed into the weigh hopper; as the correct weight is neared the slide valves close in progressive stages. The final small quantities necessary to complete each weighing are admitted to the weigh hopper by a succession of short, rapid reciprocating movements of the slide.

The weigh hopper itself is in each case of the bottom-opening type, the discharge mechanism being actuated by pneumatic cylinders. The six weighers are arranged in two lines of three. Beneath each line runs a chain conveyor (Fig. 11) which takes the material away for conveyance to the mixers.

For any given formula any number of weighers can be operated and discharged simultaneously into the subsequent conveying system, enabling some mixing to be achieved by the conveyors before the material reaches the mixers. As soon as the required amounts of material have been passed

into the conveying system, a timer comes into action which prevents the use of the conveyors until materials already in the system are cleared by delivery into the appropriate mixer.

4. Processing and Sacking-off Plant

The chain conveyors taking material away from the weighers both feed into a 12-in screw-lift elevator, which discharges into a 13-in dia worm conveyor serving the six 2-ton conical mixers. This conveyor has a direct feed into three of the mixers, the other three mixers being served by three intermediate conveyors which branch off at right angles.

When materials for a complete mix have been delivered to a mixer, the mixing cycle begins automatically. Completion of the mix is signalled by an indicator light on the central control panel, and automatic discharge into a hopper below the mixer is effected, provided there is sufficient room in the hopper to receive the mixed material. Otherwise, the material is held in the mixer until released by push-button control.

Two of the conical mixers are devoted to pig-meal production, the remainder feeding into the cubing and pelleting plants (see Fig. 15). The six mixers and the cubing and pelleting equipment were all supplied by Richard Sizer, Ltd., of Hull. The finished products, whether cubes, pellets or meal, are conveyed into an adjacent building and delivered into storage hoppers. The outlets of these hoppers are equipped with automatic gross weighers, supplied by Richard Simon & Sons, Ltd., of Nottingham, which facilitate the rapid weighing and sacking-off of the finished products (Figs. 16 and 17).

Flexibility

In the space of this article it has not, unfortunately, been possible to convey a truly adequate picture of the ways in which the various conveyors are inter-linked to provide the utmost flexibility of operation. Some 50 different conveyors and elevators are installed and these may be combined sequentially to provide numerous different routes for the various materials throughout all stages of manufacture.

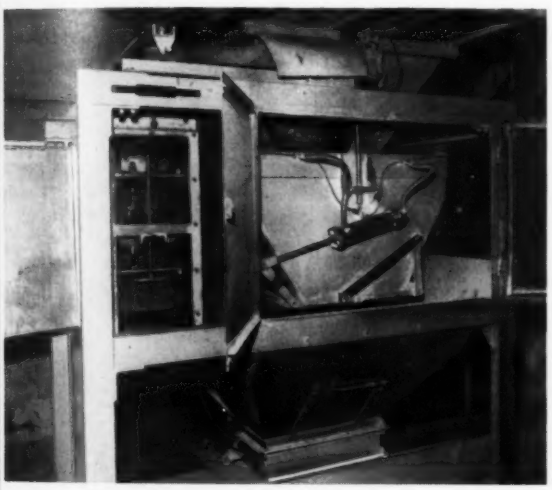
As a simple example of the kind of flexibility which has been built into the system, four of the 10-in worm conveyors

Fig. 11. One of the automatic weighers which receive material from blending bins and discharge weighments into chain conveyor

Fig. 12. Another view of one of the automatic weighers fed from outlets of four blending bins

Fig. 13. This picture shows the automatic weighing mechanism whereby amounts of from 7 lb to 2 tons can be proportioned automatically

Fig. 14. Pneumatically operated slide valves controlling feed into the automatic weighers



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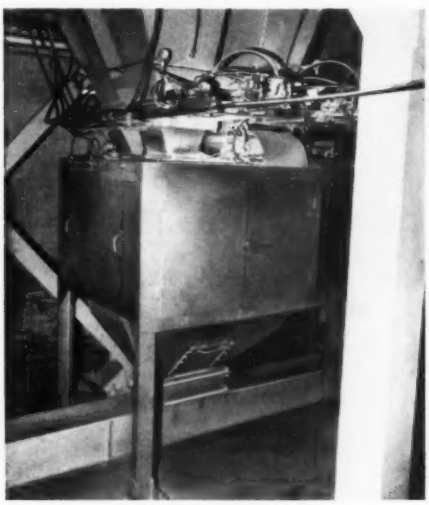

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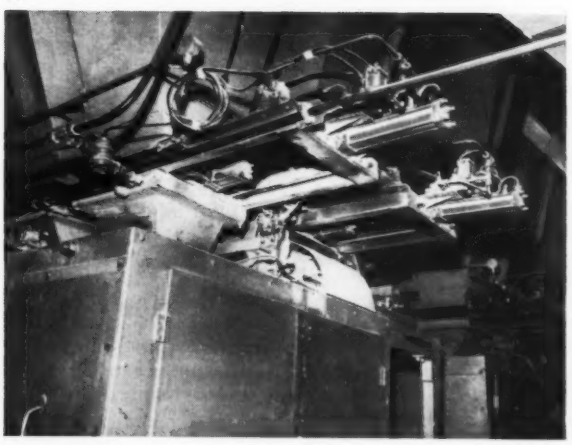


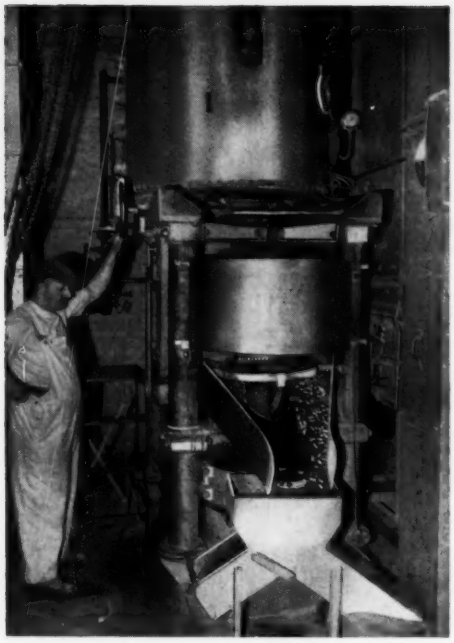


Fig. 15. View of one of the cubing machines

Fig. 16. Animal feeding stuffs are sacked off by means of automatic gross weighers

which convey ground material into the blending bins also have a direct feed into the 14-in worm conveyor feeding the mixers. Thus, if desired, it is possible to by-pass the blending operation and feed materials direct from the grinders to the mixers.

The remaining two 10-in worm conveyors feeding the blending bins can be fed either from the grinders or from tip-in hoppers. In case of breakdown in the grinding or blending plant, therefore, the same tip-ins can be used to feed direct into either the grinding bins, the blending bins, or the mixers, all of which are widely separated. Material from any of the 20 silo bins can be sent to any of the five grinding bins. It may then be sent to any one of the 24 blending bins or to one of the six mixers. At every stage sack-off points are provided to enable material to be withdrawn from the system for sale.

Conveying Equipment

As has been seen, in addition to the conventional chain conveyors, worm conveyors and bucket elevators, nine screw-lift elevators have been installed. The largest of these is the 12-in dia machine which feeds the worm conveyors serving the mixers. It reaches to a height of some 48 ft, and is powered by a 15-h.p. motor at 720 r.p.m., the machine speed being 250 r.p.m. The other eight screw lifts are all of 9 in dia and operate at 250 r.p.m. One is powered by a 5-h.p. motor at 250 r.p.m., all the others being driven by 7½-h.p. motors at 250 r.p.m.

The construction of the screw-lift elevator was fully described in an earlier issue of this journal.* Briefly, it consists of a vertical screw or worm running in a tubular casing, the speed of rotation being three times that usually employed in conventional worm conveyors. Screw lifts are suitable for handling capacities of from 100 cu.ft/hr.

Most of the other mechanical conveying equipment is of conventional design. In addition, there is the pneumatic equipment associated with the separating plants and the grinding plants. In the case of the separating plants the pneumatic equipment removes the dust from the Apex rubble separators and allows it to settle out in cyclones, from which it is sacked off. Each separator has its own pneumatic dust-removal plant driven by 2½-h.p. motors at 1,440 r.p.m. giving a fan speed of 2,720 r.p.m.

In the case of the grinding plant, the five grinders are associated with independent pneumatic systems which convey material from the grinders into cyclones from where it passes into worm conveyors, as already described. The three No. 5 Barron impact grinders are associated with systems having a fan speed of 1,900 r.p.m. driven by 12½-h.p. motors at 1,440 r.p.m. The two No. 3D-type impact grinders are associated with systems having fans operating at 2,850 r.p.m. and powered by 7½-h.p. motors.

Fig. 17. General view of the final sacking-off plant

*Mechanical Handling, March, 1955, pages 163-164.

A survey of mobile conveyors and elevators, portable and transportable conveyors, and similar equipment — Part 14

'NON-FIXED' CONVEYORS AND ELEVATORS

by J. M. Beskine, B.Sc.(Eng.)

R. A. LISTER & CO., LTD., are deservedly well known for their range of air-cooled diesel-engined auto-trucks and associated auto-truck equipment. They are equally well-known for their range of industrial mobile conveyors, and Lister mechanical handling consultants are available to demonstrate ways and means of reducing handling time, labour and cost, by combinations of both ranges of handling equipments. The report which follows describes Lister industrial mobile conveyors.

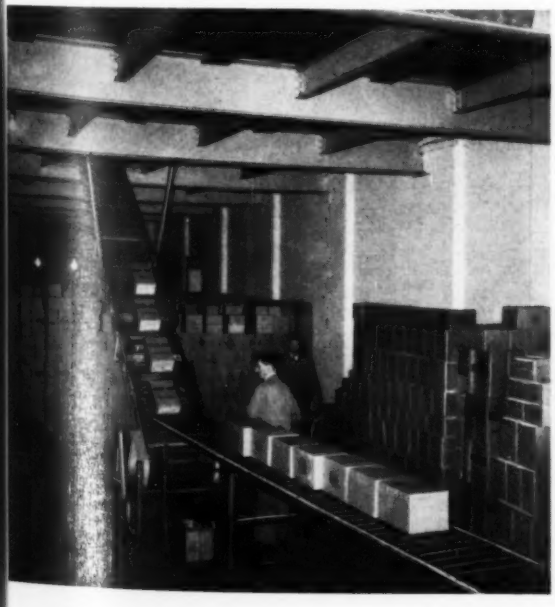
Five Standard Mobile Conveyors

Five standard mobile conveyors are made by R. A. Lister & Co., Ltd., for industrial and general commercial use. These are the models PL6, PL9, PL12, PL18 and the Multi-Level conveyor. A number of agricultural mobile conveyors are also made. Although specially designed mobile conveyors are not normally made to customers' own specifications, a number of special-purpose loaders have been made for government departments and similar purchasing agencies. In addition, static loaders have been supplied to customers for incorporation into special handling schemes of their own. These static loaders are based on Lister mobile conveyor booms.

Two examples of application of static loaders based upon mobile conveyor units are shown in Figs. 187 and 188. It is worth noting that, as a general rule, when static conveyors or elevators are being installed it may pay to make use of 'packaged' units based upon mobile conveyors already available. It may also be worthwhile using standard mobile conveyors when semi-mobile conveyors are required, such as suspended pivot-mounted bridge-type conveyors, etc.

Fig. 187. Type PL12 Lister mobile conveyor boom used as a static floor-to-floor elevator in a Salford warehouse

Fig. 188. Lister type PL18 mobile conveyor boom in use as a static floor-to-floor elevator at the British Road Services Vere Street Warehouse, Salford, working in conjunction with a gravity roller conveyor



Drawings showing the principal features of the PL6, PL12, PL18 and Multi-Level conveyors are given in Figs. 189, 190, 191 and 192. Capacities and basic dimensions are summarized in Table 1.

The five types are shown at work in the various application photographs. The smallest conveyor made by Lister', their type PL6, is shown at work in Figs. 193 and 194. The next largest machine, type PL9, is shown in Figs. 195, 196 and 197. Type PL12 is shown in Figs. 198, 199, 200, 201 and 202. Type PL18 is shown in Figs. 203, 204 and 205. The Multi-Level machine is shown at work in Figs. 206, 207 and 208.

The Lister PL6 mobile conveyor was specially designed for the stacking of all types of packaged goods in warehouses having low ceilings or where girders or stanchions cause obstructions and prevent larger conveyors from being used. The machine is compactly designed and is powered by a Brook ¾-h.p. drip-proof cage rotor type fan-cooled electric motor, reversible by push-button control. The conveyor is worm-gear-driven from the electric motor shaft, the whole transmission system being neatly and robustly mounted on

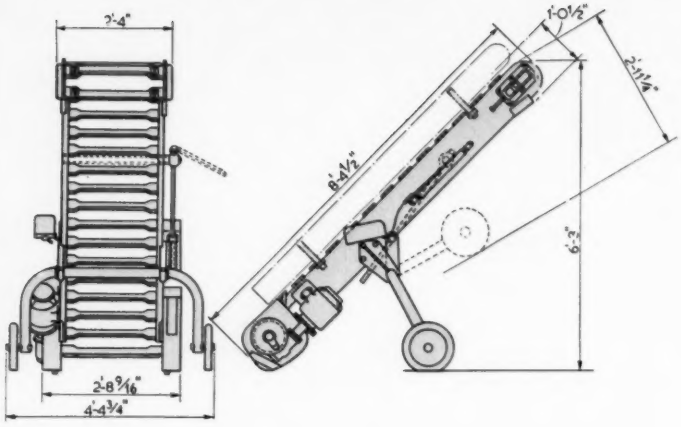


Fig. 189. *Basic dimensions of Lister type PL6 mobile conveyor*

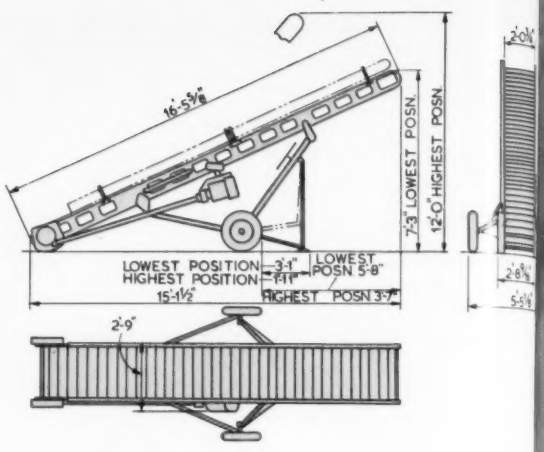


Fig. 190. *Basic dimensions of Lister type PL12 mobile conveyor*

TABLE 1.—Capacities and Basic Dimensions of Lister Mobile Conveyors

Type	Loading Height	Delivery Height min.	Delivery Height max.	Overall Dimensions width	Overall Dimensions Length	Weight (approx.)	Conveyor Speed	Maximum Load distributed	Maximum Load concentrated	Boom Length
		ft in	ft in	ft in	ft in	cwt	ft/min	cwt	cwt	ft in
Multi-Level	Ground Level to 7 ft 6 in	7 6	17 6	7 0	17 3	8¾	65 to 80	3	2	18 0
PL6	Ground Level	3 0	6 0	4 3	8 0	5¼	60	2½	1½	8 0
PL9	Ground Level	4 0	9 0	4 5	12 0	7	60	3	2½	12 0
PL12	Ground Level	7 3	12 0	5 6	16 6	9¼	60, 75 or 100	4	2½	16 6
PL18	Ground Level	7 6	18 0	7 0	25 0	12	60, 75 or 100	4	2½	25 0

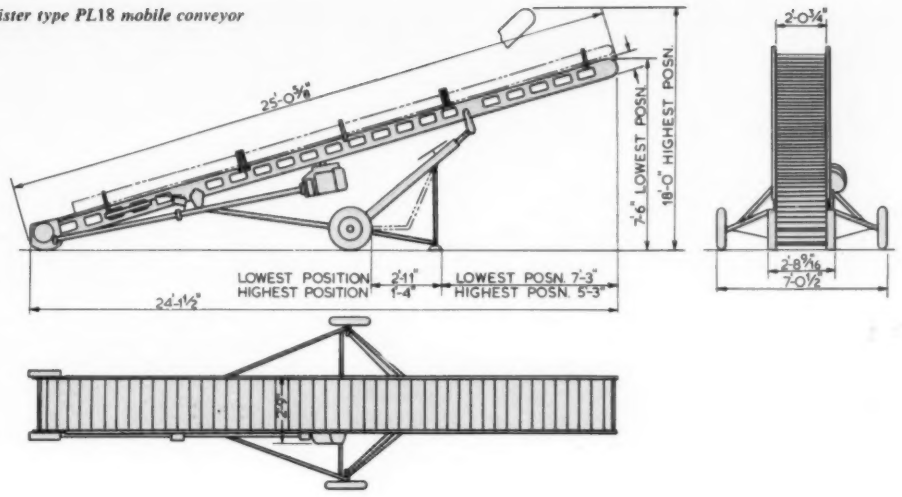
the right-hand side of the elevator foot, as shown in Figs. 193 and 194. It may also be noticed that the electric motor is complete with its own enclosed switchgear and starting mechanism.

The conveyor boom is 8 ft 4½ in long and 2 ft 4 in wide. It is of the chain and slat type, with wooden slats and angle iron load plates on intermediate slats. The conveyor shown in Fig. 193 is loading crates of bottled milk from a cold store on to a roller track, for gravity feed to a loading bay. This machine has lifting bars and angle irons on every fifth slat, to allow for crate length and loading and off-loading clearances. The machine shown in Fig. 194 is stacking sacked seed in a warehouse having a very low roof and in this case the lifting bars are spaced somewhat closer together, every fourth slat, but although this is shorter than sack length, when handing seeds and similar material in properly closed sacks, it does make for fast and secure handling.

The type PL6 Lister mobile conveyor is normally operated at about 60 ft/min, using a 50: 1 reduction worm-drive and a 1,420 r.p.m. motor. It has a removable towbar and is mounted on a pair of 12 × 2 cushion-tyred wheels carried in a heavy tubular steel under-carriage of simple but functional design. Height control is by means of a screw-threaded shaft and linkage, designed for one-man control. The minimum delivery height is under 3 ft and the maximum delivery height is 6 ft. The machine weighs 5¼ cwt and can handle unit loads of up to 250 lb each. It

Fig. 193. *Lister type PL6 mobile conveyor loading crates of bottled milk from cold store to a roller conveyor track, for delivery to loading bay*

Fig. 191. Basic dimensions of Lister type PL18 mobile conveyor



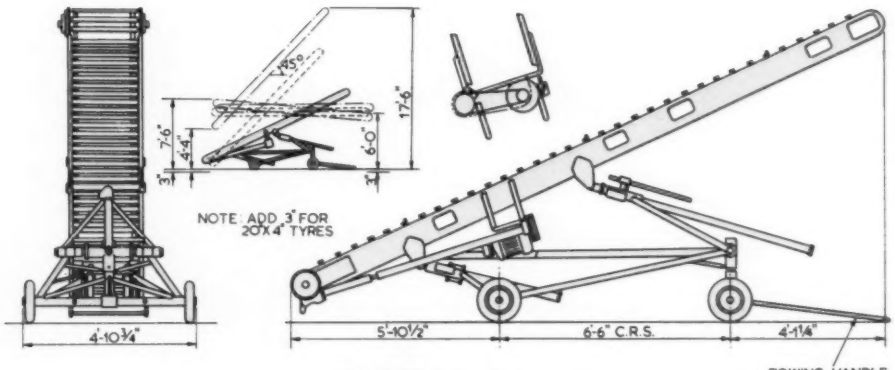


Fig. 192. Basic dimensions of Lister Multi-Level conveyor

BELOW

Fig. 194. The great advantage of employing a Lister type PL6 mobile conveyor in a warehouse having low headroom and awkwardly placed stanchions is seen from this action photograph

is easily manœuvred into position by one man and can be fitted with accessories such as sideboards, and hopper and top sack platform. (These accessories are described elsewhere in this report.) The conveyor is ideal for lorry loading or unloading, as well as warehouse work and can handle bales, sacks, cases, crates, boxes, drums and similar unit loads.

The Lister PL9 mobile conveyor is generally similar in design and construction to the model PL6 already described, but has a greater boom length and reach. It delivers to a maximum heigh of 9 ft and is shown in Fig. 195, 196 and 197.

Type PL12 mobile conveyor is a full-sized warehouse machine and is widely used, also, in factories and mills. Fig. 198 shows a petrol-engine-driven model loading crates of beer on to a lorry at a bottled beer store. Fig. 199 shows a machine employed by the Borough of Warrington for the handling of waste paper from delivery by collection vehicles to baling press. This machine is electric motor driven. A more conventional application is shown in Fig. 200. Here an electrically driven machine is seen

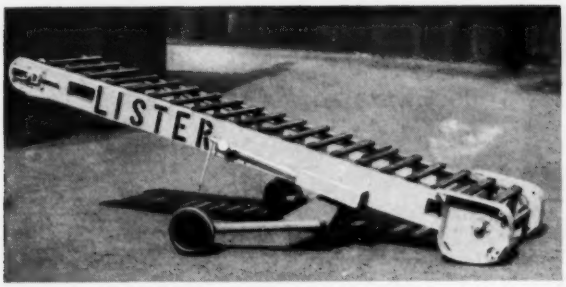


Fig. 195. *The Lister type PL9 mobile conveyor in the lowered position*

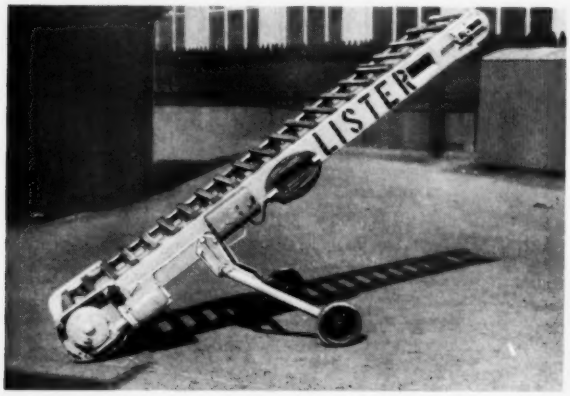


Fig. 196. *The Lister type PL9 mobile conveyor in the raised position*

elevating bags of seed in a seed dressing and cleaning depot

The Lister PL12 mobile conveyor is just under 16 ft 6 in in length and is 2 ft 10 in wide. Delivery height is variable between 7 ft 3 in and 12 ft, delivery height control being by means of a mechanically operated telescopic tube. An adjustable telescopic stand ensures stability during loading and its mode of action is clearly seen in Fig. 200. This conveyor is normally fitted with wooden slats bolted to steel linked chain. Power is provided by either a 2½-h.p. air-cooled petrol engine, or by a 1,500-r.p.m. 2-h.p. electric motor. Electrically driven machines have totally enclosed shaft and worm reduction gears and are reversible. The

Fig. 199. *Lister type PL12 mobile conveyor employed by the Borough of Warrington for the handling of waste paper from collecting vehicle to baler. This machine is electrically driven*

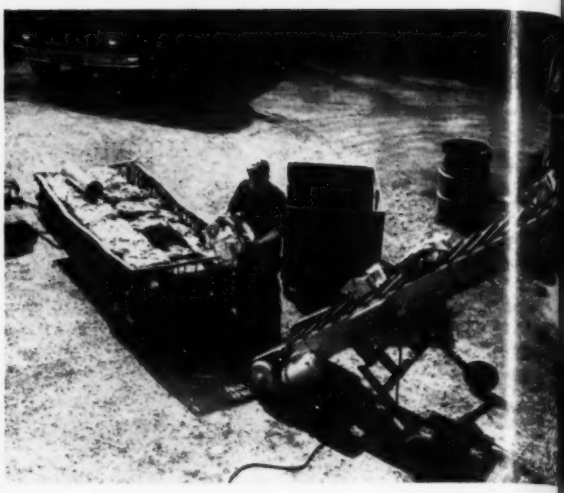


Fig. 197. *The Lister type PL9 mobile conveyor at work, handling bales of scrap metal between trailer and upper floor reception bay*

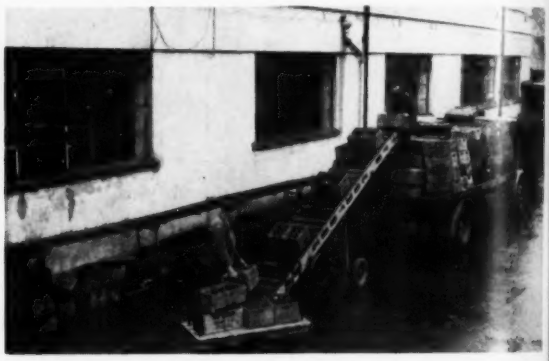
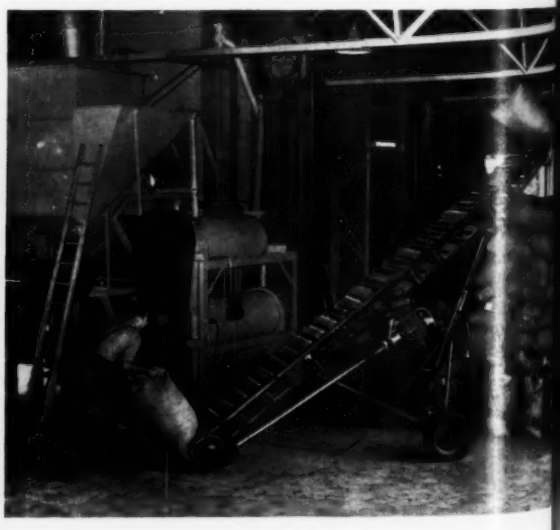
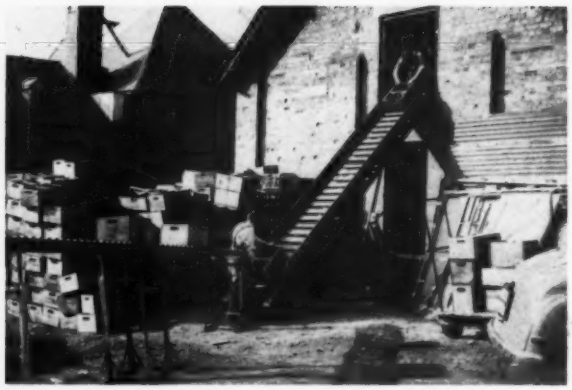


Fig. 198. *Petrol-engine-driven Lister type PL12 mobile conveyor loading a lorry with crates of bottled beer*

Fig. 200. *Stacking bags of seed in a seed cleaning and dressing plant with the aid of a Lister type PL12 mobile conveyor*



BELOW
Fig. 203. Lister type PL18 mobile conveyor handling bales of feeding stuff from ground level to upper floor storage



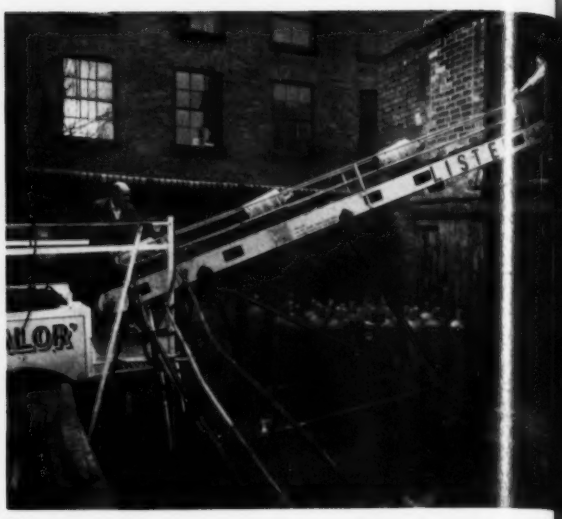
ABOVE
Fig. 202. A good combination of gravity roller conveyor and Lister type PL 12 mobile conveyor at a brewery store

LEFT
Fig. 201. This photograph illustrates the good inherent stability of the tripod-type stabilizer used on Lister PL12 mobile conveyors. The conveyor shown is used to load and off-load railway wagons directly from and to an upper floor storage bay

motor is mid-mounted on the left-hand side of the machine, very close to its centre of gravity. Petrol-engine-driven machines have engines mounted beneath the conveyor mid-point position and supported on the wheel axle as shown in Fig. 198. This makes them easy to move into position by one man. (If an engine were to be mounted very far from the centre of gravity it would make a two-wheeled mobile conveyor awkward to move about by one man, unless counterbalanced by the general design and weight distribution of the machine.)

Fig. 204. Lister type PL18 elevating boxes of fruit

205



206

Fig. 205. *Stacking bundles of soft wood boarding in a timber store, with the aid of a Lister type PL*18 *mobile conveyor*

Fig. 206. *Lister Multi-Level mobile conveyor off-loading bottled gas from a lorry, for delivery to a first-floor warehouse bay. This conveyor is petrol-engine driven. It is also available with electric motor drive. Note chute in foreground for moving gas bottles from lorry to ground level*

Fig. 207. *Lister Multi-Level conveyor loading a barge at a canal-bank warehouse*

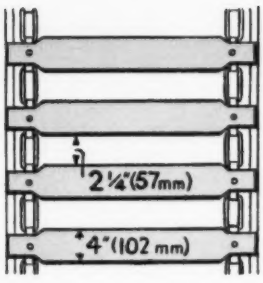
Fig. 208. *Lister Multi-Level mobile conveyor working as a steep-angle elevator, handling brewer's grains at Burton-on-Trent*

208

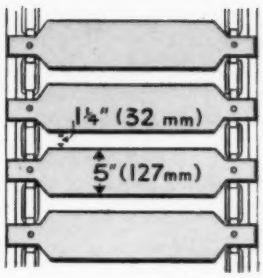
207

The PL12 mobile conveyor can be supplied to run at one of three alternative speeds: 60 ft/min, 75 ft/min, or 100 ft/min, by using reduction gears of 50: 1, 40: 1 or 30: 1 respectively. Three types of standard track are available, as shown in Figs. 209, 210 and 211. The machine weighs 9¼ cwt, can handle units weighing up to 250 lb, and deal with total loads of 4 cwt on the conveyor at once (448 lb). It has a strong tubular steel frame and is mounted on two 20 × 4 four-ply pneumatic tyres or on steel wheels.

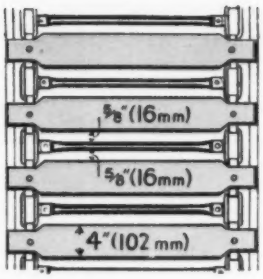
Side boards are available and can be quickly removed when handling wider loads. Side boards are, of course, useful when handling sacks, etc., to avoid damage by rubbing.



Standard track for general loads



Special 'B' type with wider slats



Special 'C' type track for handling small objects

Figs. 209, [illegible] and 211. Three types of [illegible] available with Lister mob[illegible] conveyors

A top sa[illegible] platform can also be fitted. This holds the sack ready for [illegible]ff-loading by the operator when loading a lorry or delive[illegible]g sacked material to the top of a stack in a warehous[illegible] The machine is strong, powerful, light and easy to ha[illegible]dle and is very widely used.

The Lister type PL18 mobile conveyor is generally similar to type PL12, already described, except that the reach is longer, and the maximum delivery height is correspondingly greater. The conveyor boom is just over 25 ft long and maximum and minimum delivery heights are 18 ft and 7 ft 6 in respectively.

Lister Multi-Level Mobile Conveyor

The Lister Multi-Level mobile conveyor, the fifth of the standard machines made by the firm, is shown in Figs. 206, 207 and 208. This conveyor is highly versatile and is designed to carry a distributed load of up to 350 lb. It will load at ground level for delivery to any height between 8 ft 3 in and 13 ft and load at any height between ground level and 7 ft 6 in for delivery to heights ranging from 6 ft to 17 ft 6 in according to loading height. In addition, the machine can work as a horizontal conveyor of maximum height 7 ft above ground level.

This conveyor is mounted on four rubber-tyred wheels and is easily adjustable for delivery height by means of a self-locking mechanical jacking system. It weighs about 10¾ cwt and is balanced for towing. It can be powered by petrol engine or by electric motor. Where electric motor drive is used, a 1½-h.p. totally enclosed motor is employed, running at 3,000 r.p.m. The conveyor track is reversible, track speed being 60 ft/min, 75 ft/min or 100 ft/min. The use of a reverse speed makes this type of conveyor invaluable for warehouse handling and vehicle off-loading duties.

Two wheelbase widths are available: 4 ft 11 in for use where narrow wheelbases are advantageous, as in confined spaces, and 7 ft for use where extra width is required.

There is a range of attachments for use with this conveyor, side boards, top sack platform and track hopper, as already described for the types PL12 and PL18 conveyors.

Examples of application of the Lister Multi-Level mobile conveyor could be drawn from a very wide range of industrial handling job studies. One typical application is for loading crates of beer on to a lorry. The boom can be raised during the loading process, to enable the operator on the lorry to put crates straight on to the stack, eliminating any working zones requiring extra manual lifting. Fig. 206 shows heavy bottles of bottled gas being off-loaded from a lorry into a first-floor warehouse bay. This machine is petrol-engine driven and, as can be seen from the illustration, it can prove invaluable when elevating goods from vehicles to upper floor levels.

Two features deserving special mention when considering Lister mobile conveyors are as follows. Firstly, in addition to choice of electric motor or petrol engine drive, diesel engine drive is also available on models PL12 and PL18. Secondly, each of the machines briefly described has particularly good overhang features. This, in conjunction with good inherent stability, means that the various conveyors are well able to reach out to loading and off-loading points beyond the confines of wheel position.

MINING MACHINERY EXHIBITION

Comprehensive Display in London next July

THE Mining Machinery Exhibition, sponsored by the Council of Underground Machinery Manufacturers, to be held at Olympia, London, from July 9th to 18th, will provide the most comprehensive display of mining machinery and ancillary equipment ever presented in Britain, it is claimed.

The exhibits on nearly 100 stands will cover all kinds of underground equipment required by mining undertakings of all types throughout the world. The applications of hydraulics in mining enterprises of every description will be fully demonstrated. Great progress has been made recently in this branch of mining engineering of which British manufacturers have made a particular study. Many examples of hydraulic-powered machinery will be on view at Olympia.

Many other new developments from British factories will be displayed, including improved power-loaders with continuously rated water-cooled motors; new designs of feeder conveyors; together with the latest types of drilling, cutting, conveying and loading machinery, not only for use in coal mines but in salt, gypsum, iron-ore and other mines in all parts of the world.

Ten years have elapsed since the last exhibition organized by the C.U.M.M. was staged in London. This decade has been one of intense development in the design and use of mining equipment of all descriptions. Unlike most other British industries, underground machinery manufacturers have not been in a position during the post-war years fully to exploit the export fields open to them. This has been due largely to the demands of the National Coal Board for machinery to carry out the modernization of the British coal mines.

To-day, however, with increased output coming from the factories and with the declining needs of the N.C.B., the C.U.M.M. consider that the time is opportune to demonstrate to the world the immense strides this specialized industry has made in recent times.

A three-day symposium on Shaft Sinking and Tunnelling will be held at Olympia concurrently with the Exhibition (on July 15th, 16th and 17th), and will be organized by the Institution of Mining Engineers.

First Electronic Computer Exhibition
points the way to new developments

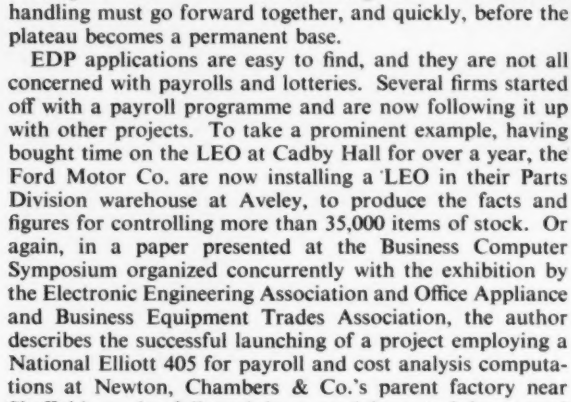
HANDLING IN THE FACTORY OF THE FUTURE

By K. Mumby

It has been said of the mechanical handling industry that British manufacturers are leaders in their field but inadequate use is made of the equipment they offer. Justification for that statement diminishes steadily year by year. To-day the same thing is being said of the makers and potential users of computers, and already there are signs of a similar favourable trend. There is, however, a lack of balance in the use made of the digital computers and the electronic data processing systems (EDP) built around them; a failure to exploit their dynamic function, and a tendency to regard them as instruments of consolidation rather than exploration.

To a layman visiting the first Electronic Computer Exhibition at Olympia, looking at these powerful machines and trying to discover what they can do and what they are doing, it seems that the main army of EDP users has halted on a plateau of progress from which it and a militant contingent from the manufacturing side of materials handling must go forward together, and quickly, before the plateau becomes a permanent base.

EDP applications are easy to find, and they are not all concerned with payrolls and lotteries. Several firms started off with a payroll programme and are now following it up with other projects. To take a prominent example, having bought time on the LEO at Cadby Hall for over a year, the Ford Motor Co. are now installing a LEO in their Parts Division warehouse at Aveley, to produce the facts and figures for controlling more than 35,000 items of stock. Or again, in a paper presented at the Business Computer Symposium organized concurrently with the exhibition by the Electronic Engineering Association and Office Appliance and Business Equipment Trades Association, the author describes the successful launching of a project employing a National Elliott 405 for payroll and cost analysis computations at Newton, Chambers & Co.'s parent factory near Sheffield, to be followed by material control in general engineering and excavator manufacture by their main subsidiary company, Ransomes & Rapier, Ltd., Ipswich.



'Samastronic' card-operated tabulator incorporating 700 characters/sec output printer

PLUTO was permanently surrounded by a silent crowd, watching and listening. The model represents a data-processing system of Ferranti digital computer in conjunction with Powers-Samas card reader, punch, magnetic tape individual storage units and controller, and output printer

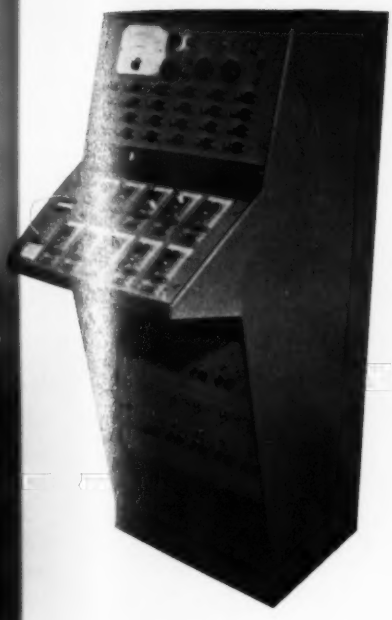
Another well-known company, Stewarts & Lloyds, with a LEO II, followed up their payroll application by the forecast of a digging programme in their quarries. Other payroll projects undertaken by British Timken and G.E.C., both using a B.T.M. 1201, were succeeded by production planning and control.

Authors of other papers described the use of an I.B.M. 650 by Talbot Stead to select optimum sizes and quantities of their raw material, and of a Stantec ZEBRA to make the design calculations for Bibby's animal feeds.

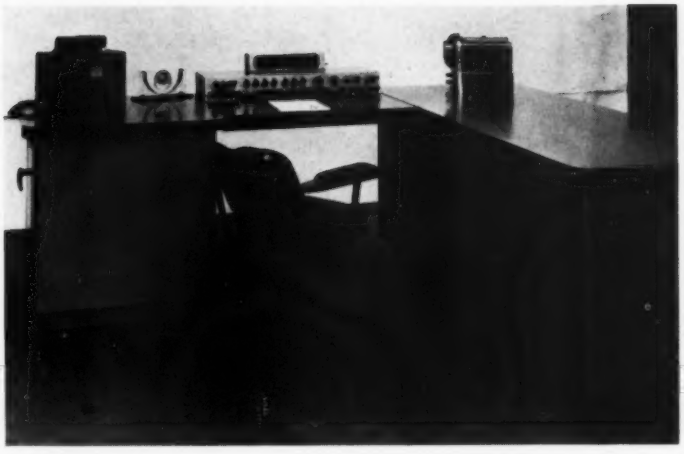
Computers Show a Profit

In another computation undertaken at the I.B.M. Data Processing Centre for the National Coal Board, the optimum method of transporting coal from collieries to gas works was determined. The cost of the service was less than £400, and it led to a saving of 3 per cent on a weekly expense of £55,000.

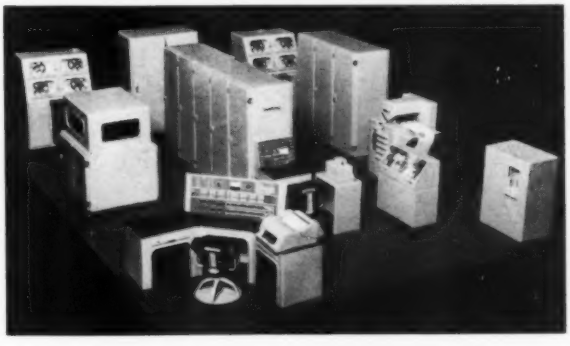
English Electric's DEUCE computing service is utilized in a production control programme described by another of the speakers at the symposium. It has been in service since March 1938 in a factory operated by Job White & Sons, Ltd., Leek, Staffs, with 600 employees, for the production of knitted garments. Computer time is bought for 1-2 hours a week, at an average charge of £50, and the initial cost of programming was £3,000. Returns were already apparent within a twelvemonth, in the shape of improved quality control and a three-fold rise in direct productivity.



Solartron 'Minispace' analogue computer, the size of a radiogram, but a fully self-contained unit for the design and control engineer



In the 802 'Compudesk' National-Elliott make provision for programme-sharing control operations



Model, built by Metropolitan-Vickers apprentices, of their company's newly developed 1010 data-processing system, in which operations are speeded by data-scanning and programme-scanning facilities

Computer time costs £25-50/hr, and one gets a lot for it. For a large wad of percentages needed by the writer for a statistical analysis and sent to Manchester University via a London agent some years ago, the £5 or £6 charged seemed a token payment.

No less than seven companies are now offering famous machines for computing services. While the exhibition was in progress, one among them, LEO II, a few hundred yards away at Cadby Hall, was engaged on the following service work:—

Atlas Assurance Group—pension valuations
C.A.V.—mathematical operations
Eagle Star Group—pension renewals and evaluations
Ever-Ready—van sales and stock control
Ford Motor Co.—payroll
Greenwich Borough Council—payroll
Kodak—payroll
Social Surveys—Gallup poll
South Eastern Gas Board—prepayments
Stock Exchange Brokers—share yields
Tate & Lyle—payroll

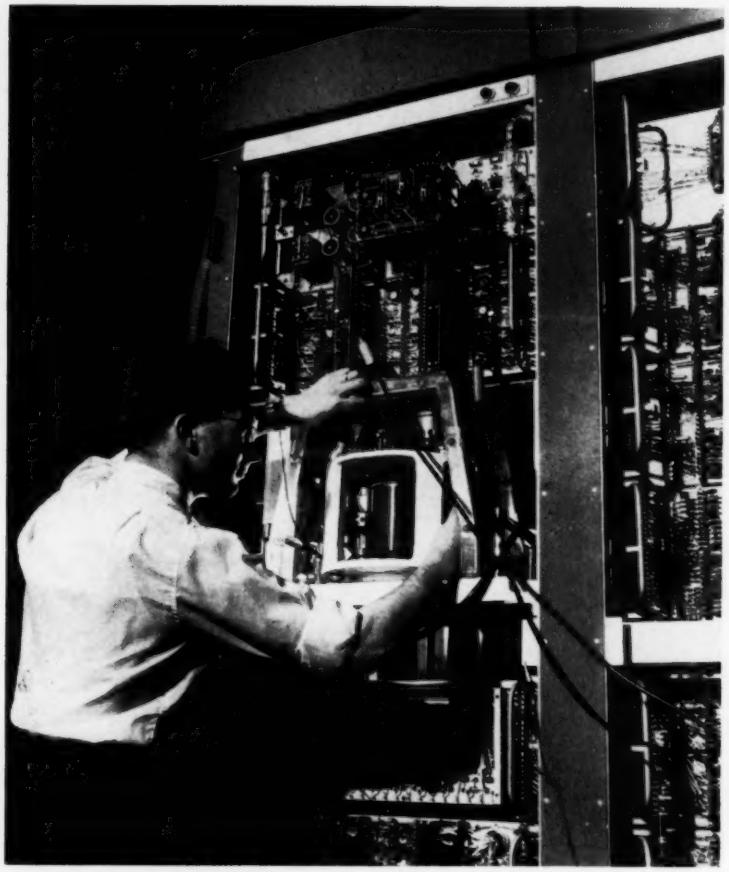
This list probably shows a greater preponderance of accounting operations than would be found in those of most of the companies offering such services; certainly the DEUCE computers at Marconi House and Stafford, and Elliott-Automation's analogue and digital equipment at Boreham Wood, might be expected to have some engineering or scientific work on hand at any time.

Users of these services share the benefits of the combined experience of computer staff and other users, including the interchangeable programming elements built up into libraries of sub-routines, routines, and even complete programmes, that can defray much of the initial preparatory costs.

We Have the Tools

Among the computer manufacturers themselves there is evidence of fruitful co-operation between companies possessing inter-dependant techniques—at the Electronic Computer Exhibition, as at the Mechanical Handling Exhibition, there were links between the stands. Combinations of forces (and business associations) between the tabulating side, the electronics engineers, the instrument specialists, and the control engineers, had produced such joint efforts as PLUTO (Ferranti's computer in a Power-Samas data-processing system incorporating punched-card machines, tabulator, and a high-speed printer) and the Panellit 609 (National Cash Register Co., Ltd., Elliott Brothers (London), Ltd., and Panellit, Ltd.), in which the computer is linked with high-speed scanning facilities in a data processing and control system for industrial plants.

Alliances such as these, and the techniques brought in by other firms famous for their specialized knowledge of electrical engineering, or the making of business machines—B.T.H. for instance, and B.T.M., E.M.I., English Electric, I.B.M., Metropolitan-Vickers, Standard Telephones—have brought the digital computer to a high state of development in a short period of time. Noticeable improvements have been made recently, not only in speed and sophistication, but also in the lowering of running and replacement costs, the greater flexibility and ease of maintenance, and the improved reliability, that have resulted from the replacement



Engineer making final adjustments to magnetic drum backing store of English Electric DEUCE computer

of valves by high-frequency junction-transistors, and the adoption of printed circuits and unit-construction techniques. These methods have not been adopted by all the major manufacturers of digital machines, but the trend is there.

Analogue computers, the speciality of the aircraft and control engineers, show other and more individual trends. They are not concerned in the serious state of unbalance that has developed around the big digital computers. These big machines are the tools we want, but we have not provided ourselves with the necessary ancillaries. They are like an excellent automatic tile-making machine that met with undeserved failure. It produced tiles in the quantities that were needed by the men working on the roof, but the men down below could not get them away fast enough from the mouth of the machine and they scrapped it instead of installing a conveyor.

Handling Methods Are Not Good Enough

No one is going to scrap a computer, but failure to provide adequate arrangements for dealing with material at the input and output stages could cripple the development of high-speed data-processing machines.

Because of the binary code in which it works, the digital computer must deal with masses of material. It must store thousands or millions of bits of information in a state of immediate accessibility, and this matter of storage was for some time the computer's own principal internal problem. It could not get at items fast enough in the immediate-access store constituting its memory. Access-speed improved with the adoption of magnetic drums, magnetic cores, magnetic tape, capacitors, mercury delay-lines, and other devices, but at the cost of maintaining a large and expensive buffer store. A clever solution was found in the RAMAC device brought over from America by IBM in which 5 million characters can be accommodated on magnetic discs with concentric rims, like gramophone records, that are tiered 50 high with gaps between. As the tiered discs revolve at 1,200 r.p.m., their upper and lower surfaces can be scanned by the arms of read-write heads, which are capable of vertical and radial movement.

Metropolitan-Vickers, in their newly developed 1010 data-processing system, solve the problem in another way by means of a fast scanning device which moves continuously over the store, transferring and preassembling information in readiness for the computing unit.

This computer has an operating speed of 12-20 micro-seconds, which means that it can set up and execute instructions at rates of 50,000-83,000 instructions a second. In achieving this speed of computation, however, this machine, and others like it, are creating problems of storage and of handling at the input and the output end. Generally speaking, information is presented to the computer in the form of code-signals from punched paper tape, magnetic tape, or punched cards. On leaving the computer, the information must be printed out or punched into tape or cards. Until very recently the machines available for reading and punching tape and cards, and for printing, were entirely inadequate, in speed and capacity, for the task. Some new machines, shown publicly for the first time at the Electronic Computer Exhibition, made a breakthrough—or offered the promise of a breakthrough—for the most spectacular were at the unfinished prototype stage.

On the input side there was a tape reader, a card reader, a print reader, and a figure reader, all of which could transmit signals to the computer. On the output side there were printers and a punch. For the buffer-storage of incoming and outgoing information, and integration and bulk storage in the computer itself, there were improvements in the means of handling and feeding magnetic tape. These developments will be reviewed in our next issue.

IBM 650 data processing system, incorporating four magnetic tape units, seen behind output printer

PLANT AND EQUIPMENT FOR PUBLIC WORKS AND CIVIL ENGINEERING CONTRACTORS

Part 2 of the review by our own reporters of mechanical handling equipment introduced at the Public Works and Municipal Services Exhibition

Heavy tractors and earthmoving machines were reviewed in the first part of this report, which was published in the January issue of Mechanical Handling, pages 21-30. Plant and equipment of a more general nature, including cranes and hoists, trucks, conveyors, mixing plant, silos and other containers, pumps, engines, transmission gear and friction materials, are covered in this article.

Mobile Cranes

Jibs giving a height of lift up to 150 ft can be fitted to the new NL.250 25-ton lorry-mounted crane exhibited by **R. H. Neal & Co., Ltd.**, London. It was shown on a Neal-Thornycroft 'Big Ben' crane-carrier, though other chassis can be used. It has a Ford 50-b.h.p. diesel engine fitted with a Brockhouse torque converter driving through a Hardy-Spicer propeller shaft to the main gearbox.

Operated by enclosed gearing running in oil, the full-circle slewing ring on a patented cross-roll bearing is controlled by single-plate reversing clutches and slewing brake. The hoist unit, which can also be used as a winch, gives a rope pull of 6¼ tons, but its hydraulic controls make fine inching possible. Engine-controlled lowering is a standard feature and can be disconnected if desired. The derrick unit is mounted on top of the A-frame and driven from the main transmission gearcase, through a transfer gearbox, and operated by double-plate reversing clutches driving through bevel-and-worm gearing, with an automatic safety brake on the worm shaft. The crane has a maximum lifting capacity of 25 tons at 10-ft radius when supported by its four stabilizing jacks and 10 tons at the same radius in the fully mobile condition.

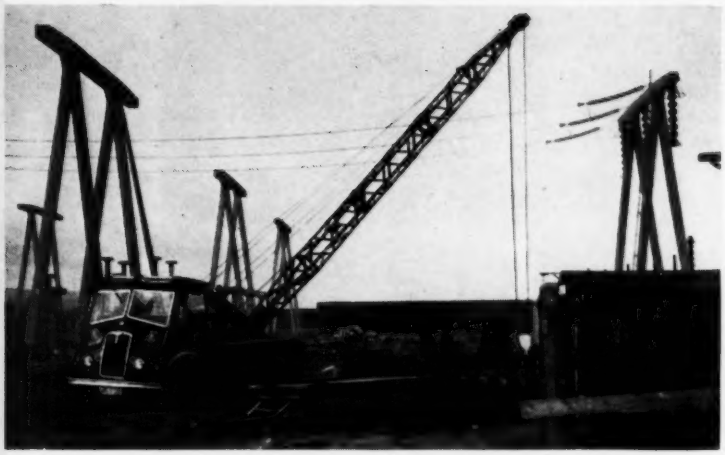
The NL.250T is a heavy-duty model of substantially similar design. It has outrigger jacking beams at a high level to clear uneven ground.

NL.250 25-ton crane mounted on Neal-Thornycroft 'Big Ben' carrier is seen in middle-background (R. H. Neal & Co., Ltd.)

BELOW LEFT

The new 'BK-Fifty Ranger' excavator-crane equipped with 50-ft jib and mounted on heavy-duty chassis with Leyland 'Hippo' running gear powered by a Leyland 0·600 diesel engine (Blaw Knox, Ltd.)

With their 'BK-Fifty Ranger', **Blaw Knox, Ltd.**, London, introduce a universal truck-mounted machine capable of operating as a crane, dragline, pile-driver, face-shovel, drag-shovel, or skimmer. As a crane, it provides a maximum lifting capacity of 25,000 lb and a boom range of 30 ft to



Automatic hydromechanical braking is provided on all three motions of the compact and fast-working 'Hydrocon Highlander' (Brown & Tawse Plant, Ltd.)

70 ft. Equipped as an excavator, it will handle 0·5 cu. yd. of material.

The 'Ranger' was exhibited as a crane, with a 50-ft jib, mounted on a heavy-duty chassis fitted with Leyland 'Hippo' running gear and a Leyland 0-600 six-cylinder diesel engine developing 125 b.h.p. at 1,800 r.p.m. The boom operates independently of other motions and can be raised or lowered while the hook is loaded; the jib is raised by engaging the clutch and lowered under power transmitted by planetary gears on releasing the brake. A hook-lowering device enables the load to be lowered mechanically under positive and accurate control at speeds regulated by the throttle opening. The chain drive is protected by a safety device that disengages the clutch if the brake is applied during power-lowering.

Engagement of the heavy-duty drum clutches is facilitated by servo-assisted controls. Levers are coupled through toggle linkages to ensure positive engagement without physical effort.

Safety is the dominant characteristic of the 'Hydrocon Highlander', which was introduced by **Brown & Tawse Plant, Ltd.**, Manchester, as the latest addition to their range of truck-mounted cranes. Hoisting, derricking and slewing motions are operated by three independent and interchangeable rotary hydraulic motors and full protection is provided by automatic hydro-mechanical brakes on all three motions. These motions, and the throttle, are controlled by delicately balanced levers, with dead-man return to neutral. With all the other controls necessary to operate the machine they are mounted in the cab, from which the driver has an unobstructed view in all directions.

Safe working loads are up to 5 tons blocked on outrigger jacks, or 3 tons free. Jibs are available in lengths of 18 ft to 48 ft. Excluding the jib, the crane, when mounted on a Thornycroft S.W.B. chassis, is 7 ft 6 in wide, has an overall length of 17 ft and it occupies a headroom of only 9 ft 7 in. With a maximum rear overhang of 32 in, it can operate in confined spaces and is, indeed, claimed by the manufacturers to be the most compact truck-mounted slewing crane in production.

Fast operating speeds are obtainable. Hoisting is at the rate of 180 ft/min on a single rope, 90 ft/min on two falls, or 45 ft/min on four falls. Derricking from the horizontal through an angle of 75 deg occupies about 22 sec and slewing through 355 deg can be accomplished in 20 sec. On the road, the vehicle is capable of a top speed of more than 40 m.p.h.

The range of mobile Jones cranes handled by **George Cohen Sons & Co., Ltd.**, London, was represented by the KL 10-6, introduced six months previously at the Mechanical Handling Exhibition. It was mounted on pneumatic-tyred restrictor wheels, providing increased bearing area and greater stability on soft ground, and fitted with a Perkins P.6 diesel engine and a 50-ft jib.

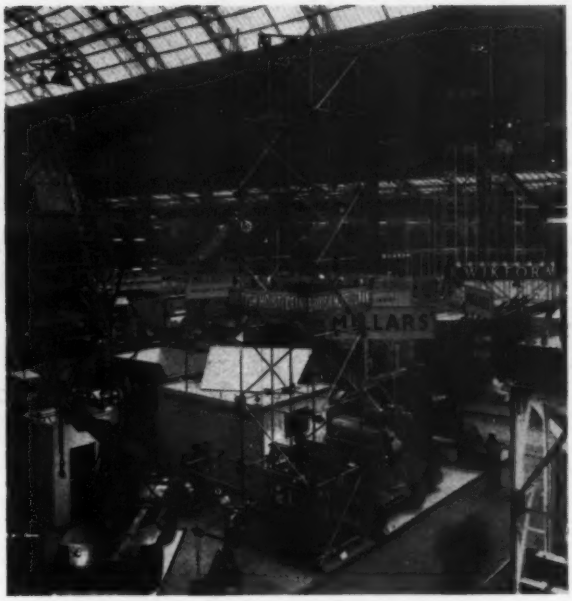
Tower Cranes

With the trend toward larger blocks of flats and offices, demand for tower cranes is growing visibly and the long lattice jibs reaching out above the tops of multi-storey buildings have become a familiar sight in London and other large cities. The base section of a Liebherr climbing crane shown by **Tower Cranes, Ltd.**, London, is identical with units in operation on Guy's hospital and other notable building projects, and was due to be built in Killarney in a few months' time. It incorporates the power pack, which is operated remotely from a push-button control panel rigged for demonstration on the stand.

Lifting capacities up to 3,659 lb at 98-ft 3-in radius, or 11,023 lb at 33-ft, are available in the Liebherr range. The jib can be raised at speeds of up to 213 ft/min and derricked through 68 deg in 70 sec. To obtain their maximum outreach, the large site-cranes have tilting towers, which can be derricked through 34 deg in 100 sec. All models can be slewed and are available with telescopic towers.

With mast retracted and jib folded back, the crane becomes a transportable unit of 8-ft 6-in overall width that can be towed on the public highways. Swivelling rail-mounted bogies, enabling the undercarriage to negotiate S-bends and inside radii of 11 ft 6 in and 14 ft 9 in and also to travel on tracks of varying gauge, are among the other new features.

Fixed-mast luffing version of Schwing tower crane (Greenham Equipments, Ltd.)



Hand-operated hydraulic 'Hywork' servicing platform (Anderston Clyde Engineers, Ltd.) (Above left)

Platform of 'Aydee' mobile scaffolding is raised by two power-operated hydraulic rams (Auto Diesels, Ltd.) (Above right)

Centre-slung hoist operating in tower of tubular scaffolding. (British Hoist & Crane Co., Ltd.) (Right)

Greenham Equipments, Ltd., Greenford, accommodated the upper and lower sections of a Schwing crane on their stand. The model shown was a luffing type with fixed mast, slewing from the base, which is available in two models providing safe working loading capacities of 1 ton at 52-ft maximum reach, or 27 cwt at 72 ft, but the current range includes climbing cranes with luffing jibs or with horizontal jibs and travelling crabs.

Like the Liebherr cranes, the Schwing is transportable as a unit, but the mast is folded to achieve the necessary reduction in length. Climbing models can be equipped with undercarriage units and, when greater height is needed, with extendible outer masts, and these can accommodate elevators for raising material from ground level to the working level of the building. A maximum outreach of 100 ft is attainable in the larger models. The hook can be raised to a height of 164 ft with the standard luffing mast and a wide range of increments is available when additional sections are brought into use. Hoisting speeds are up to 230 ft/min and crab-traverse and derricking speeds up to 115 ft/min.

Hoists and Working Platforms

Portable working platforms were featured by several exhibitors, among them **Anderston Clyde Engineering, Ltd.**, Chadderton, who showed their 'Colossus' hand-winch-operated 'self-raising' gantry and 'Hywork' hand-hydraulic servicing platform, both of which were introduced at the Mechanical Handling Exhibition. The wheel-mounted cantilevered 'Hywork' equipment was developed for the servicing of aircraft and is now offered as an extendible general-purpose working platform with a minimum load-carrying capacity of 400 lb on the platform, or 250 lb on the jib that is available as an optional extra.

With a safe working load of 1 ton, distributed, the platform of the 'Aydee' scaffolding exhibited by **Auto Diesels, Ltd.**, Uxbridge, can be raised to a maximum height of 15 ft 6 in. The chassis supports two lifting arms operated by a power-driven Plessey pump. The hydraulic system is controlled from the platform and protected against overloading by a pressure-relief valve. The platform can be locked mechanically in various positions, and the chassis is mounted on pneumatic tyres and equipped with overrun brakes to enable it to be towed to and from the site. The equipment conforms with the Building (Safety, Health and Welfare) Regulations, 1948.

Among the new attachments shown by **Whitlock Bros., Ltd.**, for use with their power shovel, was a 'Hilift' platform for overhead maintenance work. The platform is also suitable for erecting scaffolding and loading materials at high scaffold-levels. It can lift 600 lb to a maximum height of 20 ft and the maximum outreach in front of the tractor is 16 ft at 5 ft 6 in or 5 ft at 20 ft height.

A tower of tubular scaffolding had been erected on the stand of **British Hoist & Crane Co., Ltd.**, Compton, Berks, to demonstrate the operation of their centre-slung hoist. Consisting of a lightweight platform running inside the tower and raised by a power-driven winch and pulley gear, it is flexible and simple in operation. The rope passes round pulleys mounted on a cathead at the top of the tower and a slewing pulley on the gauge-base. A patented automatic knock-out is fitted at the base of the structure, which can be extended by the addition of sections coupled by B.H.C. jointing pieces. The winch can be driven by petrol or diesel engines or an electric motor. Loading capacities range from 7 cwt to 1 ton, and hoisting speeds from 105 ft/min to 210 ft/min.

Also shown was the 'Saga Junior' scaffold hoist, which has recently been made available with a diesel engine as an alternative to the petrol and electric power units. Weighing only 1¼ cwt, it is attached to the scaffolding by built-in couplers with a swivel-pad at the base that allows the unit to be swung through a full circle. The diesel-engined unit, with a lifting capacity of 5 cwt, is said to consume only ½ gal of fuel in a day of seven working hours.

Rope-testing techniques were illustrated by a display of instruments on the stand of **British Ropes, Ltd.**, Doncaster, where there was also a static demonstration of the nine stages in the production of the 'Superloop' splice introduced at the Mechanical Handling Exhibition.

Dump-Trucks and Dumpers

With an 18-cu. yd. body of abrasion-resisting steel plate

Powered by Rolls-Royce 300-b.h.p. turboblown diesel engine, this FR6/45 dump-truck has a payload capacity of 56,000 lb (Fodens, Ltd.)

welded to a frame of 7-in × 5-in channels, and a payload capacity of 56,000 lb, the new FR 6/45 dump-truck built by **Fodens, Ltd.**, of Sandbach, is a splendid machine to look at and is covered by an impressive specification. The drive from a Rolls-Royce turboblown engine, developing 300 b.h.p. at 2,100 r.p.m. and a maximum torque of 840 lb-ft, is transmitted through a 17-in dia Rochford clutch and C.O. torque converter and a three-speed gearbox, and thence to the rear axle via a Hardy Spicer propeller shaft. The front wheels are steered by means of a Foden power-assisted system and are carried on a Kirkstall axle provided with three-point suspension by semi-elliptic sliding springs. The Clayton air-assisted foot brake operates on the single front and twin rear wheels, all of which are fitted with 18-in × 25-in 28-ply 'Rock Lug' tyres. The hand lever operates a transmission brake with a disc diameter of 20 in.

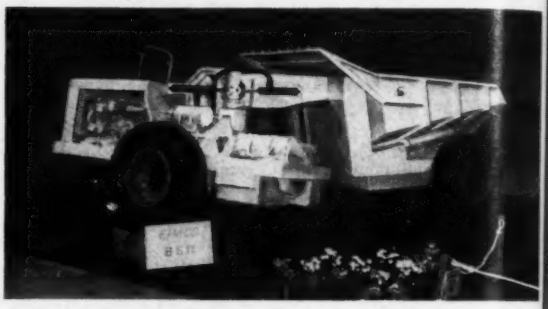
Tipping to an angle of 65 deg is effected in 8 seconds by a Hamworthy pump operating a single double-acting ram, and the return stroke occupies 5 seconds. Maximum travel speeds are approximately 24 m.p.h. forward and 12 m.p.h. reverse, with the body fully laden, but the vehicle can travel at approximately 30 m.p.h. without load. Instrumentation includes an hour-meter and rev-counter, and the 12-V batteries have a rated capacity of 153 Ah. With a full payload the gross weight of the FR 6/45 is 104,000 lb.

Said to be the most powerful in this country, the SN 27-ton dump-truck shown by **Aveling-Barford, Ltd.**, Grantham, has a Rolls-Royce eight-cylinder diesel engine of 400 b.h.p., a six-speed gearbox, and power-assisted steering. Alternative Rolls-Royce and Cummins six-cylinder engines can be fitted, with which torque converter and power-shaft transmission are optional. Pivoted on large rubber bushes, the welded high-tensile steel body is tipped to an angle of 67½ deg by twin hydraulic two-stage rams.

With two-way steering and dual foot controls, the new SR 6-cu. yd. dumper can be driven with equal ease forward or backward. It has a Dorman 100-b.h.p. diesel engine or a Leyland 113-b.h.p. six-cylinder unit and a constant-mesh gearbox, providing four forward and two reverse speeds. The welded steel body, which is tipped to an angle of 70 deg, has a protective canopy that extends over the driver's cab.

For lighter loads the Barford 150 2-ton dumper has a forward gravity-tipping hopper with spring-loaded check-

SN 27-ton dump-truck fitted with Rolls-Royce eight-cylinder diesel engine developing 400 b.h.p. (Aveling Barford, Ltd.)



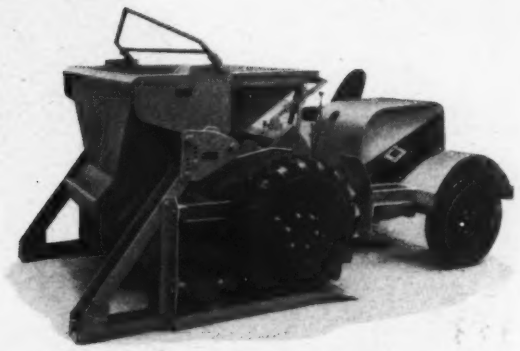
Steering axle of 850 dump-truck swung through 180 deg by action of hydraulic rams. Powered by Leyland 144-b.h.p. diesel engine, it will climb a 1-in-4 gradient with full 22,400-lb payload (Elmco (Great Britain) Ltd.)

The driver has all-round visibility when operating the new Muir-Hill 6-cu. yd. gravity dumper (E. Boydell & Co., Ltd.)

chains. The engine is a Petter P.C.2 twin-cylinder high-speed, air-cooled diesel, driving through a three-speed gearbox and a Salisbury hypoid-geared front axle.

Manœuvrability of a high order is attained by the designers of the Eimco 850 dump-truck displayed on the stand of **Eimco (Great Britain), Ltd.**, Gateshead. Articulation between the front and rear units of the centrally pivoted welded rolled-steel chassis is 15 deg, and the forward unit can be swung through 180 deg by means of four hydraulic steering rams. The turning radius is 10 ft 6 in and the

Driver of multi-skip dumper can hook up and set down interchangeable skips without leaving his seat (Thwaites Engineering Co., Ltd.)



Johnson dumper with detachable concrete skip in position on 'Trip Skip' automatic skip-removal and loading stand (C. H. Johnson (Machinery), Ltd.)

machine will climb a gradient of 1 in 4 when carrying its full payload of 22,400 lb. The air-assisted foot brake operates on all four wheels, the mechanical hand brake acting on the driving wheels only.

Power from a Leyland AU 600/35 diesel engine, developing 144 b.h.p., is transmitted through a 16-in dia clutch to a gearbox providing five forward ratios and one reverse and incorporating a transfer drive. All wheels are fitted with 14-in × 24-in Goodyear 'Rock-Lug' tyres. With a wide mouth and low lip, the heavily reinforced rock body is designed for easy loading and can be tilted to a discharge angle of 70 deg by double-acting hydraulic rams. At S.A.E. rating it has a capacity of 7·5 cu. yd.

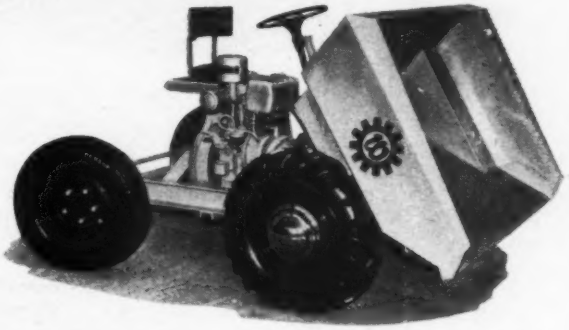
The Muir-Hill 18B 6-cu. yd. dump-truck is an entirely new model and was shown by the makers, **E. Boydell & Co., Ltd.**, Manchester. It has a Fordson six-cylinder diesel engine developing 96 b.h.p. at 2,250 r.p.m. and driving through an hydraulically operated 14-in single-dry-plate clutch, a five-speed forward and reverse gearbox, an auxiliary gearbox giving directional change, and a double-reduction rear axle incorporating hub-reduction gearing. The engine and gearboxes are carried in a fabricated cradle insulated from the main frame by flexible mountings. The machine is available with a range of all-steel bodies of the gravity type.

Dumpers

A more powerful version of the Muir-Hill 10B 3-cu. yd. dumper has also been introduced, with a four-cylinder 'Fordson Power Major' 52-b.h.p. diesel engine. It also has an hydraulically actuated clutch. The gearbox provides six forward and two reverse speeds, final drive being through a double-reduction axle. The driver's seat and steering column rotate to give identical control in both directions of travel, the pedals being duplicated. Girling hydraulic brakes are applied to the driving wheels and a transmission parking brake is hand-operated.

The Muir-Hill 3S 1-cu. yd dumper has been redesigned. The three-speed gearbox is of improved design with constant mesh in all speeds. The vehicle is capable of travelling at 12·5 m.p.h. in top gear.

Stability and manœuvrability are features of the new One-20 diesel-engined dumper introduced by **C. H. Johnson (Machinery), Ltd.**, Stockport. Of rolled steel channels, reinforced with gusset plates, the articulated chassis is rear-wheel driven for maximum traction. The front sub-chassis is pivoted to the main portion on a 3-in dia shaft and carries the front axle and steering mechanism and the skip and release mechanism. A Bishop worm-and-peg-type steering box gives positive directional control, with inner



This 1-ton Mk. V dumper is powered by the air-cooled Petter AVA.1 diesel engine (Wickham Engineering Co., Ltd.)

and outer turning radii of only 4 ft 3 in and 9 ft 9 in respectively. A Lister SLI single-cylinder cold-starting air-cooled diesel engine, governed to 6·3 h.p. at 2,000 r.p.m., drives through a Ford 7¾-in dry-plate clutch, 'Power Grip' positive drive unit and Ford gearbox, providing three forward ratios, with a maximum speed of 10 m.p.h., and one reverse, with synchromesh in second and top. A preventer device prohibits accidental engagement of reverse gear.

Dumper capacity has been correlated with the volume of wet concrete delivered by standard mixers in the new Mk 7 model developed by **Benford, Ltd.**, Warwick. With a payload capacity of 22½ cwt, the Mk 7 is designed to accommodate two batches of concrete from a 10/7 mixer, or one batch from an 18/12 or a 21/14 mixer. The skip has a maximum heaped capacity of 27 cu ft., a capacity at water-level of 18 cu. ft. and a struck capacity of 22½ cu. ft. Loading height is 41 in.

Driving through a dry-plate clutch of 8-in dia and a B.M.C. three-speed synchromesh gearbox to a Salisbury single-reduction hypoid front axle, the Lister LD2 twin-cylinder air-cooled diesel engine delivers up to 8 h.p. at 1,800 r.p.m. Speeds of up to 12·4 m.p.h. are available in the forward direction and 2·48 m.p.h. in reverse. The dumper is equipped with Land Rover steering and with Girling brakes providing a frictional contact area of 55 sq. in. Tyre sizes for the rear wheels are 4·50 in × 16 in; the driving wheels are fitted with 7·50-in × 16-in 6-ply tyres.

Bottom-discharge concrete skips, designed to be handled by crane on and off the dumper, are available for use with the Mk 7 or the existing 3 and 12/30 dumpers. These new skips become interchangeable with existing standard skips when minor modifications have been made to the chassis. They were developed to overcome the difficulty encountered

A diesel-engined Bedford equipped with the new 'Telecrete' concrete transporter fitted with a hydraulically operated agitator (Telehoist, Ltd.)

where concrete is placed by crane and the crane is unable to bring its skip in position to receive the discharge from the mixer.

Three basic types of interchangeable skip are available for use with the multi-skip dumper developed by **Thwaites Engineering Co., Ltd.,** Leamington Spa: a standard skip, crane skip and side-loading skip. Free-standing standard skips can be hooked on to a dumper fitted with a jib attachment without any need for the driver to leave his seat and this arrangement enables a continuous flow of concrete or other material to be delivered to the working area and of empty skips to be returned for filling. The jib hoist can also be used to operate a dragline and haul the bucket up from excavations up to 12 ft below the level at which the dumper is standing.

The dumper itself follows orthodox lines. Powered by a Petter AVA2 engine, with Dowty hydraulic tipping gear, Marles steering and Girling brakes, it can handle a maximum payload of 1 ton in the crane skip, or 15 cwt in the 10-cu. ft. standard skip.

Another new product on the same lines is a detachable 1-ton crane skip introduced by **C. H. Johnson (Machinery), Ltd.,** for use with their Twin-65 3E dumper. It can be made to fit any Johnson 1A, 3B or 3E dumper by the addition of a retaining bracket and support. Of 18-cu. ft. struck capacity, it has a detachable lever for actuating the bottom opening door from either the back or front. It was shown in position on the 'Trip-Skip' automatic skip removal and loading device, which consists of a steel framework based on two channels, which act as guides for the dumper front wheels. Rollers automatically lift the skip clear of the dumper chassis and it can then be released by a manually operated catch to allow the dumper to be driven away without it. The operation is reversed when the dumper picks up the skip for re-loading.

In the three-speed gearbox used in the new 1-ton Mk V dumper shown by **Wickham Engineering Co., Ltd.,** London, all gears are engaged by dog-clutches and a crash-gear pair is employed for the reverse ratio to prevent accidental engagement during forward travel. Gears are selected in the usual way. The power unit, a Petter AVA.1 series 2 air-cooled industrial diesel engine, continuously rated to develop 6 b.h.p. at 1,800 r.p.m., is governor-controlled to provide a top speed of 10 m.p.h. in the forward direction, with 2·3 m.p.h. in reverse. All wheels are fitted with 6·00-in × 16-in 4-ply tyres.

Skip capacity is 20 cu. ft. struck, 24 cu. ft. heaped and 12·5 cu. ft. water level; loading height is 3 ft.

Dump-Trailers and Tipping Bodies

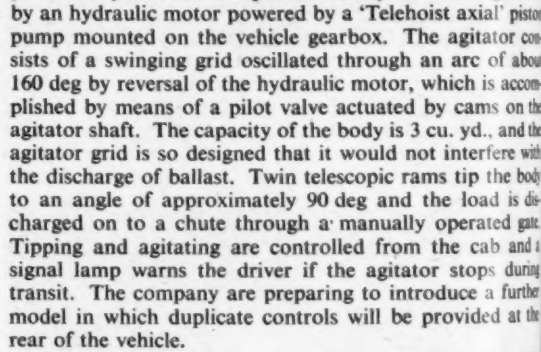
Dump-trailers for attachment to Caterpillar tractors were represented by the DW21 and PR21 rear-dump wagons. The latter is an Athey wagon weighing approximately 32 330 lb, with a struck capacity of 20·5 cu. yd., for attachment to the DW21 wheeled tractor powered by a 320-b.h.p. turbo-charged engine and capable of a travel speed of 22·6 m.p.h. or 27·9 m.p.h. Wagons of both types were exhibited by the **Caterpillar Tractor Co., Ltd.,** Glasgow.

Of 10 ton or 7 cu. yd. heaped capacity, the new Shawnee-Poole Model 7 rear-dump wagon was shown by **Steel Fabricators (Cardiff), Ltd.,** coupled with a 'Fordson Power Major' tractor, to which the two-wheel dump-trailer was attached by means of a gooseneck coupling. The trailer body is 10 ft long, 3 ft deep, and 7 ft 1 in wide at the top reducing to 3 ft 8 in at floor level, and is tipped by two hydraulic rams operating from the tractor hydraulic system. It is equipped with Girling two-leading-shoe brakes, applied by Clayton Dewandre compressed-air cylinders and 14·00-in × 24-in 12-ply pneumatic tyres.

A new addition to the 'Telecrete' ready-mixed concrete transporter shown by **Telehoist, Ltd.,** Cheltenham, is an hydraulically driven agitator, designed primarily to prevent segregation of the material, which is fitted inside the transporter body and can be operated at any time during transit by an hydraulic motor powered by a 'Telehoist axial' piston pump mounted on the vehicle gearbox. The agitator consists of a swinging grid oscillated through an arc of about 160 deg by reversal of the hydraulic motor, which is accomplished by means of a pilot valve actuated by cams on the agitator shaft. The capacity of the body is 3 cu. yd., and the agitator grid is so designed that it would not interfere with the discharge of ballast. Twin telescopic rams tip the body to an angle of approximately 90 deg and the load is discharged on to a chute through a manually operated gate. Tipping and agitating are controlled from the cab and a signal lamp warns the driver if the agitator stops during transit. The company are preparing to introduce a further model in which duplicate controls will be provided at the rear of the vehicle.

Many improved features are included in the design of the new 25-30 SD 'Freighter' fore-and-aft-tipping refuse-collector displayed by **Shelvoke & Drewry, Ltd.,** Letchworth.

Hydrostatic drive to front wheel of this prototype 'Bantam' Mk. II elevating platform truck enables speed and direction of travel to be controlled by single finger-operated lever on driver's instrument panel, clutch and gearbox being eliminated (Reliance Trucks, Ltd.)



Of 25 cu. yd. capacity, the body has a spring-balanced rear door and folding flap and a large hopper of 1½ cu. yd. capacity. The automatic body-locking mechanism is operated by the weight of the body and is foolproof. A single selector-lever controls the direction of tip and, by mechanical linkage with the hydraulic controls, prevents misuse of the tipping gear and acts as a safety lock when travelling. A 90-b.h.p. diesel engine drives through a new five-speed gearbox and a Clayton Dewandre 'Hydrovac' boosts the application of the Girling brakes.

Long-load Carriers and a Platform Truck with Hydrostatic Transmission

Hydrostatic transmission has been employed to drive the road-wheel of the 'Bantam' Mk. II elevating platform truck exhibited in prototype form by **Reliance Trucks, Ltd.**, Heckmondwike. The vehicle is composed of a driving and steering unit mounted on a single wheel, and a load-carrying platform supported by two wheels on a solid rear axle. An hydraulic pump, driven by a 588-c.c. J.A.P. air-cooled petrol engine developing 5·5 b.h.p. at 1,800 r.pm., delivers pressurized fluid to two hydraulic motors by which power is transmitted to the roller-chain final drive. The motors can be driven in series or in parallel, the flow of oil being controlled by lever-operated valves to procure high or low speed ranges and forward or reverse travel.

The front axle, supporting the drive wheel, hydraulic motors and steering gear, is mounted in a swinging bracket allowing the wheel to be rotated through 180 deg, and is suspended from a coil spring. The chequer-plate platform is raised and lowered through a vertical distance of 5 in by two hydraulic rams. These also are controlled by lever-operated valves. Steering is controlled by a 15-in dia steering wheel operating through reduction gears and a roller-chain linkage between steering column and drive wheel. Internal expanding brakes operate on the rear wheels

All movements are controlled from the driver's seat. The torque transmitted by the engine in the high and low power ranges, and hence the speed of travel and of platform elevation, is controlled by a finger-operated lever. The same lever is used to select the forward or reverse direction of travel. A second lever opens the circuit to the platform rams. Steering wheel and foot brake complete the list of driver-operated controls. Clutch and gearbox have been eliminated. In the forward or reverse direction, or in changing from forward to reverse, the take-up is smooth and fast and the engine cannot be stalled.

Two British-built carriers for handling long and cumbersome loads, both of which have been described in detail in articles published in *Mechanical Handling*, were shown for the first time at a public exhibition.

The 'Kestrel' side-loading fork lift carrier exhibited by **Materials Handling Equipment (Great Britain), Ltd.**, London, and now being produced in their new Maidenhead factory, is the subject of a technical report on pages 67-72 of this issue. The 3-ton model was on view, equipped with a crane-jib attachment. Another exhibit was the 2-ton 'Eagle' fitted with an hydraulically operated load-clamp. These machines, with their long-load-carrying platforms and forks that are traversed sideways across the deck to pick up and set down material, have, with their predecessors the German Irions, been seen at many demonstrations reported in this journal, handling long and random lengths of timber and steel and stacking them in narrow aisles.

Also capable of picking up and transporting long and awkward loads and of operating in narrow aisles, but not of stacking or loading on to vehicles, and also the subject of a technical report (*Mechanical Handling*, November 1958), and demonstrated previously, but never before exhibited to the public, is the Mk. 2 version of the straddle carrier

Hydraulic pump and motors replace gearbox and clutches in Mk. II version of the monorail transporter (Road Machines (Drayton), Ltd.)

produced by the **British Straddle Carrier Co., Ltd.**, London, under the control of the General Engineering Division of Short Bros. & Harland, Ltd. The load is straddled by the wheels, lifted by swinging hooks and clamped beneath the superstructure. Weights of up to 20,000 lb can be handled by this machine, but length is virtually unlimited and units 100 ft long have been accommodated successfully.

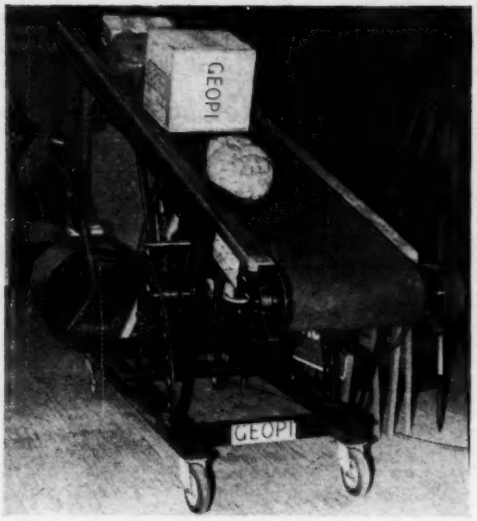
Conveyors and Transporters

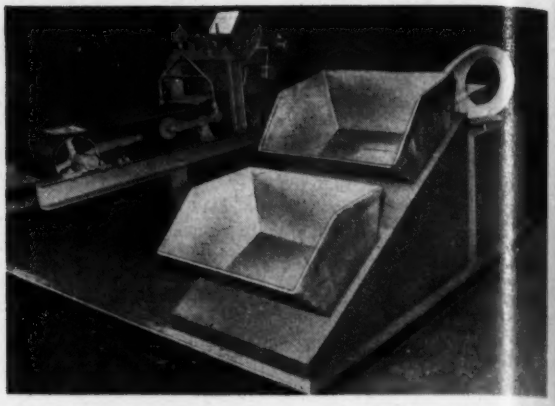
Hydrostatic transmission has been applied also in the new Mk II version of the monorail transporter exhibited by **Road Machines (Drayton), Ltd.**, West Drayton. The skips of the transporter travel on a monorail track, supported on adjustable stands, which can be laid in standard 6-ft or 12-ft sections on the ground, on scaffolding, or on any convenient part of the building under construction. Each skip can carry a payload of 2,000 lb and will hold 12½ cu. ft. of wet concrete or provide a capacity of 14½ cu. ft. struck, or 27 cu. ft heaped. Powered skips, driven by 420-c.c. B.S.A. petrol engines, tow one or more unpowered units.

In the Mk II version, a gear-type hydraulic pump and two hydraulic motors replace a gearbox incorporating two single-plate clutches and transmit the drive to two wheels engaging the side of the rail. This has resulted in so substantial an improvement in tractive effort that the maximum gradient negotiable by a powered wagon is raised from 8 deg to 11 deg and a powered wagon with two trailers can climb a 3·5 deg slope. The single-shoe friction brake of the Mk I has been replaced in the Mk II by a double-shoe external contracting brake operated hydraulically, which ensures full control of the over-run. Travelling speed is 100 yd/min.

The monorail is now available in the form of a bridge, of 24-ft or 30-ft span, which can be pushed into position by two men and enables concrete to be placed all over the required area without disturbing reinforcement.

Ready adaptability to loading conditions is a feature of the new 'Adjust-a-Belt' belt conveyor displayed by **George Pike, Ltd.**, Birmingham. Mounted on a short easily manœuvrable carriage fitted with rubber-tyred castors, it is supported by two tubular steel members pivoted at a common centre to the carriage. The support member at the loading end is pinned at one of three alternative positions to the conveyor frame, and its angular position is also adjustable by inserting a crossbar in any of seven holes in two quadrants welded to the carriage side-members. With these adjustments, the operating height can be varied to suit requirements. The other support member is fitted





Fibreglass-reinforced plastic elevator-buckets with high wear-resisting properties (**Sheepbridge Equipment, Ltd.**) (*Above*)

'*Adjust-a-Belt*' *conveyor in fully raised and tilted position* (**George Pike, Ltd.**) (*Left*)

at the top with a pair of flanged rollers on which the conveyor rests. By means of a winch and cable its angular position can be varied, thereby tilting the conveyor up to a steep angle or, in the raised position, downwards toward the delivery end. The profiled rubber belt ensures non-slip steep-angle loading up to a height of about 9 ft. The non-slip steel-caged drive and turn rollers are self-aligning in operation. A 1½-h.p. electric motor provides sufficient power to handle loads of up to 12 cwt, and a forward-reverse switch permits the machine to be used for raising and lowering of material.

The 'Loadascreen' introduced at the exhibition by **Frederick Parker, Ltd.,** Leicester, is a portable conveyor with vibrating screen, designed for the inexpensive conveyance of bulk materials where simple screening into two or three sizes, or the scaling-off of oversize material, is required. At the discharge head is a single-deck or double-deck vibrating screen for sizing the material, and deflecting plates direct it into lorries or on to stockpiles.

Interesting possibilities were suggested by a pair of elevator buckets made of plastic reinforced with fibreglass, which were displayed on the stand of **Sheepbridge Equipment, Ltd.,** Chesterfield. Extensive researches into the manufacture and applications of this and similar materials have been undertaken by the company and are now beginning to bear fruit. The reinforced plastic of which the buckets are made has been found to have high resistance to abrasion and impact-loading, and is, of course, extremely light in weight. These characteristics, in conjunction with a favourable thermal-conductivity factor, have suggested other useful applications, among which the fabrication of cement silos may be mentioned.

Asphalt and Tarmacadam Preparation Plant and Pavers

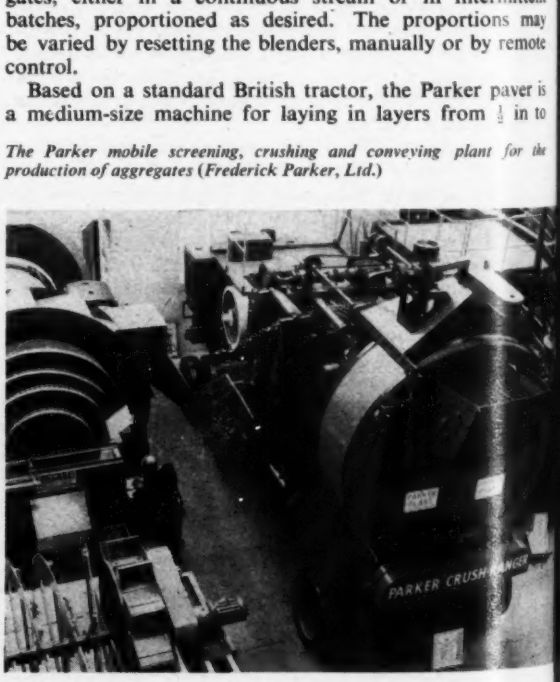
A large and varied display of new machines for the production of tarmacadam and asphalt was seen on the stand of **Frederick Parker, Ltd.,** Leicester. For handling pit-run sand and gravel the 'Crush-Ranger', mounted on four pneumatic-tyred wheels, is made in four sizes with outputs up to 180 tons an hour, producing either an all-in material or sand, gravel mixed with sand, and sized gravel separately. The main components are a three-deck vibrating screen, a 'Rocksizer' roller-bearing crusher, 'Rollsizer' roller-bearing crushing rolls, a 'Ringover' elevator, a diesel engine power-pack and delivery belt conveyors. Optional extra items of equipment are available to increase the plant's capacity to meet contract requirements.

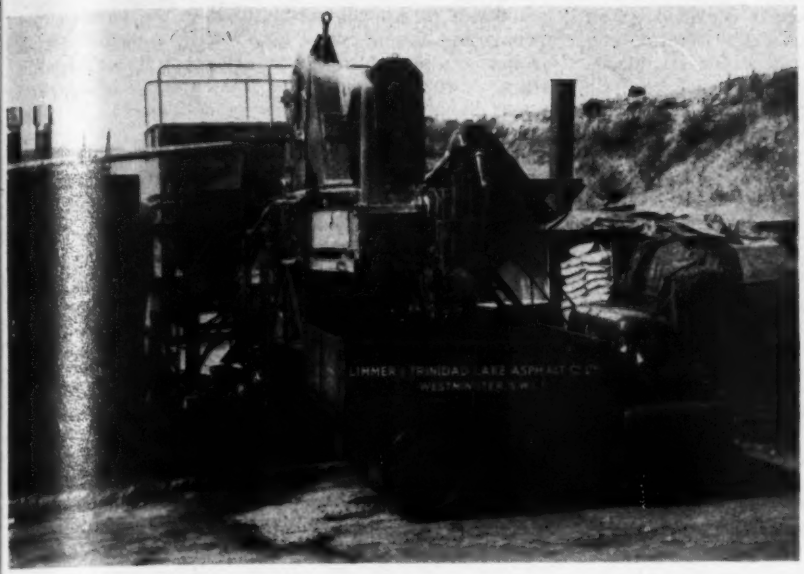
Of similar output capacity and available as either mobile or fixed equipment, the 'Starmix' 67 asphalt and coated macadam plant is designed in three sections, comprising a feeding unit with a hopper divided into two, three or four compartments, a drying unit with feed-ring, burner and exhaust fan; and a mixing unit with hot-material elevator, horizontal screen, aggregate storage and weighing equipment, batch-lifting conveyor, bitumen supply and paddle mixer. New features are the 'Parkermatic' automatic weigher and the 'Synchromix' bitumen-metering, spraying, and mixing system.

Designed for the purpose of reconstituting aggregates and supplying accurately proportioned batches to asphalt and tarmacadam plants, the Parker blender is a volumetric feeder based on the natural fall of the material through an adjustable gate, and the use of rotating paddles to assist its discharge from storage bins. Blender units may be used singly or formed into groups of any number of units, all driven by the same motor, and will deliver blended aggregates, either in a continuous stream or in intermittent batches, proportioned as desired. The proportions may be varied by resetting the blenders, manually or by remote control.

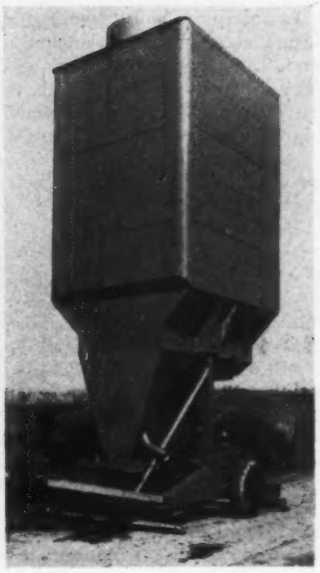
Based on a standard British tractor, the Parker paver is a medium-size machine for laying in layers from ½ in to

The Parker mobile screening, crushing and conveying plant for the production of aggregates (**Frederick Parker, Ltd.**)





A Barber-Greene Model 840-20 *continuous mixing plant in operation (Barber-Greene Olding & Co., Ltd.)*



Built-in hand-winch enables body of this mobile silo to be raised to vertical position or lowered for towing by one man (Road Machines (Drayton), Ltd.)

5 in deep, all tar and bituminous materials and non-bituminous base-courses to widths of 3 ft to 11 ft. It has a feed hopper of 2 tons capacity, a mechanically driven transfer-conveyor, a chain-driven distributing screw conveyor, a propane-gas-heated fully floating screed and an hydraulically operated cutter-compactor bar. It is power-steered with a 5-ft inside turning radius and has a top travelling speed of 17 m.p.h.

The 'Hyway' oil-heating unit circulates heated oil through a closed circuit of heat-dissipating coils and jackets to positions on a plant where heat is required. Typical applications are bitumen kettles, pipes and pumps, heavy-fuel bulk-storage tanks and boosters, paddle mixers and piping for asphalt and tarmacadam plants. There are four models, with heating capacities for 20,000 to 60,000 gal. The heater control is fully automatic and the running costs are very low. Since oil is non-corrosive, the circulating pipes remain free from lime, scale and other deposits. The distribution line-pressure is only 27-30 lb/sq. in. and the oil can neither freeze nor expand.

Designed for producing first-quality bitumen mixes at rates of up to 40 tons/hr, the new British-built Barber-Greene 840-B continuous mixing plant exhibited by **Barber-Greene Olding & Co., Ltd.,** Hatfield, comprises a mixer, dryer and gradation unit, all mounted on pneumatic-tyred wheels. The mixer and dryer have individual diesel power units; the gradation unit, employed where the aggregate requires screening after drying, is driven from the mixer. When the mixer alone is used for the production of stabilized and wet mixes, the plant's capacity is up to 50 tons/hr.

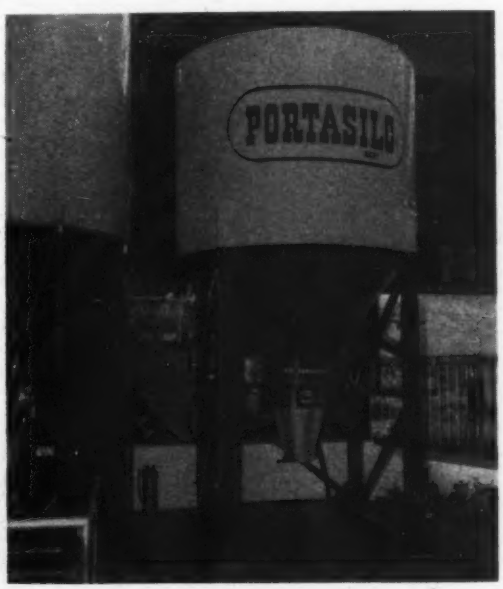
The dryer unit, which incorporates a dust collector, removes the moisture from the aggregate which is then elevated to the gradation unit for screening, each grade being fed into one of three bins fitted with adjustable calibrated discharge gates. The proportioned aggregate flows on to an apron feeder leading to the hot elevator of the mixer.

Among the numerous new productions shown by **Aveling-Barford, Ltd.,** Grantham, was the Mk. 60-90 plant for the manufacture of asphalt and tarmacadam to a predetermined specification. This semi-mobile batch-production equipment, produced by Goodwin Barsby & Co., Ltd., comprises a feed unit, with belt feeder and 'Accra-Batch' proportioners; a dryer, with feed elevator and oil burner; a hot-stone elevator, vibrating screen, mixer and self-contained filler-excavator. When started and preset for the duty required, the plant can be operated by one man from the control cabin.

Cement Silos

Road Machines (Drayton), Ltd., have produced a wheel-mounted cement silo with a capacity of 30 tons. The body of the container is pivot-mounted on the chassis and a built-in hand winch enables it to be raised to the vertical position or lowered for towing by one man.

*P*11 11-*ton cement silo for the small site (Portasilo, Ltd.)*



Power for a built-in rotary blower is provided by an electric motor or petrol engine to ensure full aeration and smooth and rapid discharge. Two concrete mixers, placed back to back, can be fed direct from the silo and accurate batching is assured by the incorporation of a balanced-beam weighbatcher, which can be operated either manually or automatically. The chassis is of robust construction and the two wheels on which it is mounted are shod with pneumatic tyres and fitted with overrun brakes.

Portasilo, Ltd., York, have brought out a new P11 model, of 11-ton capacity, for use on the small site. Batches of cement are weighed out and dispensed automatically into a steel service-hopper, from which they can be discharged as required to a barrow or other receptacle; the weight can be adjusted instantly against a calibrated scale.

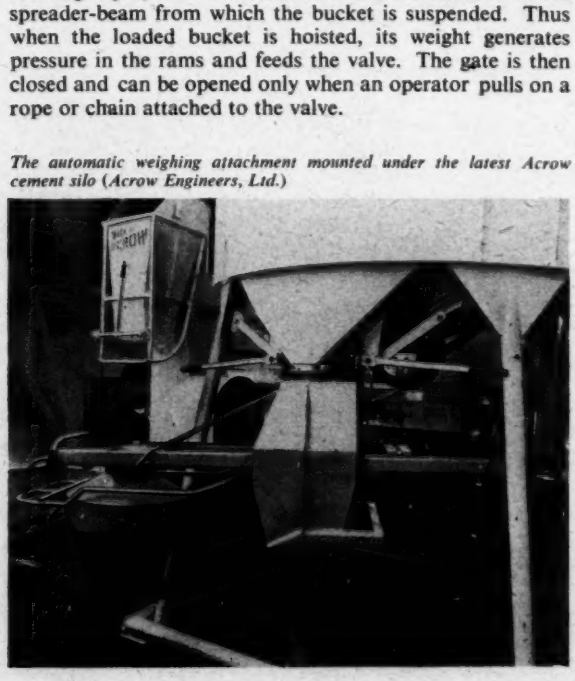
Automatic batch feed is available with their P30 model, which was shown for the first time equipped with push-button facilities for delivering cement to the mixer. The material is weighed out into the feed hopper and from there transferred to the mixer under remote control.

The latest Acrow portable silo, produced by **Acrow (Engineers), Ltd.,** London, is available in two capacities, of 15 tons and 25 tons, and will feed weighed batches of cement to either one or two mixers. It is supported on a square-based splayed-leg structure, stability being obtained by keeping down the overall height of the equipment; the height of the 15-ton silo being 17 ft 6 in, and that of the larger unit 22 ft 9 in. An automatic weighing attachment is mounted under the silo in a pivoted runway to allow the charged weigh-hopper to be drawn out and swung to the mixer-feeding positions. The cement feed is cut off automatically at the correct weight, which is preset against a calibrated scale.

Self-energizing Concrete Bucket

To facilitate the placing of mass concrete, **Blaw Knox, Ltd.,** London, have produced a self-energizing hydraulically operated bucket, which was exhibited for the first time. Opening and closing of the gate is controlled by a spring-loaded four-way valve fed by two hydraulic accumulator-rams. The piston rods of the rams are connected to two non-rotating ropes, the other ends of which are attached to the spreader-beam from which the bucket is suspended. Thus when the loaded bucket is hoisted, its weight generates pressure in the rams and feeds the valve. The gate is then closed and can be opened only when an operator pulls on a rope or chain attached to the valve.

The automatic weighing attachment mounted under the latest Acrow cement silo (Acrow Engineers, Ltd.)



Sufficient pressure is accumulated in the rams for tw opening and closing cycles, after which, if all the concre has not been placed, the accumulators can be recharged setting down the bucket and picking it up again. Th system eliminates hydraulic piping and air lines, and t time spent in connecting and disconnecting them, and t gate-opening cycle is said to be faster than that of t pneumatic system.

The bucket exhibited had a rated capacity of 4 c.y. yo its actual volumetric capacity being 141 cu. ft. A di charg area of 7·81 sq. ft. is provided by the clamshell roller ga and correspondingly wide openings are available in t other self-energizing buckets in the series, with rat ngs 3, 6 and 8 cu. yd.

Pumps

Two new 'Thor' tools of impressive performance chara teristics were exhibited for the first time by **Armstro Whitworth & Co. (Pneumatic Tools), Ltd.,** Tynemouth. discharge rate of 10,800 gal/hr at 10 ft head is achieved the 51-T sump pump, which weighs only 35·75 lb and w developed to fulfil the need for a small lightweight pump high capacity operating at heads of 10 ft to 40 ft. Und maximum load the pump consumes less than 50 cu. ft. compressed air a minute.

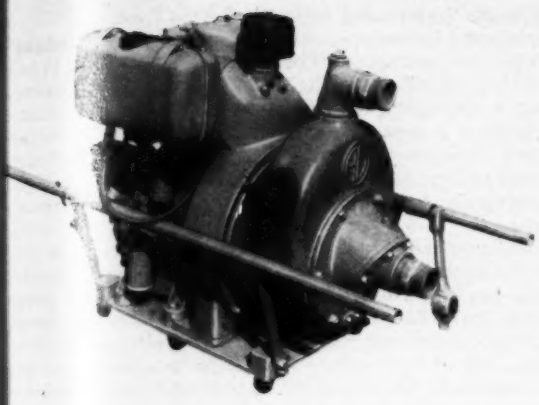
It will handle water, sewage, oil or sludge and wearing parts are fully protected. The four-blade rotary motor is lubricated by a built-in oil-mist lubricator with 16-hour storage capacity; the self-priming impeller is of nickel cast iron and is coupled directly to the rotor shaft. A built-in exhaust-muffler reduces the noise level by 30 per cent.

Though weighing less than 36 this pneumatic sump pump discharge 10,800 gal of water hour at 10 ft head (Armstro Whitworth & Co. (Pneuma Tools), Ltd.)

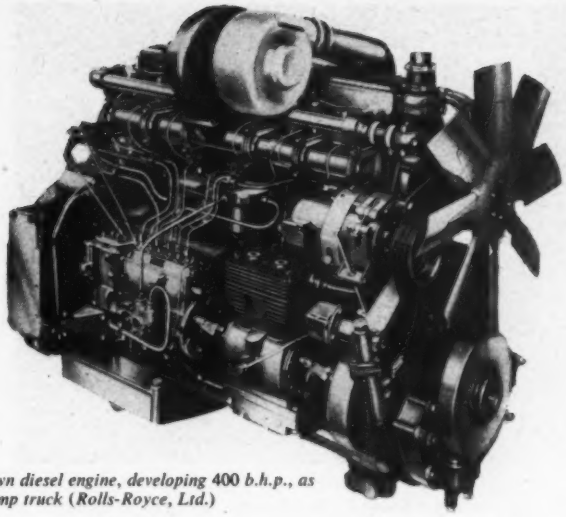
Water containing sand and lumps of rock can be handled by the W363, size 275 sludge pump, which will operate a maximum suction lift of 20 ft at 90 lb/sq. in., and deliver at the rate of 2,160 gal/hr on a head of 175 ft. Overall dimensions are only 18 in × 12 in base and 23½ in height and the pump weighs 97 lb. A silencer is fitted on the exhaust and an oil-mist lubricator can fitted at the inlet, so that the oil is atomized when reaches the working parts.

Working parts are of stainless steel and the pump intended for operation in mines and quarries and on gener constructional work, such as the erection of coffer dam where reliability and endurance are essential characteristi and where high lift combined with compact form a especially valuable.

Several new additions to their range of engine-drive pumps were exhibited by **Auto Diesels, Ltd.,** U bridg Heads up to 130 ft and outputs up to 9,000 gal/hr are obtain by the ADP 2 DA self-priming model, the development which is said to have been made possible by that of t Enfield 350 diesel engine, with its high power/weight rati which develops 4·5 b.h.p. at 3,000 r.p.m. The assembly available either as portable equipment, on vibration absorbing rubber mountings, or as a two-wheeled ful mobile unit.



Self-priming 2-in pump powered by 4·5-b.h.p. Enfield diesel engine (Auto Diesels, Ltd.)



C8.TFL eight-cylinder turboblown diesel engine, developing 400 b.h.p., as fitted in Aveling Barford SN dump truck (Rolls-Royce, Ltd.)

Maximum output rates of 7,000 gal/hr or delivery against heads up to 90 ft are available from the lightweight B2V unit, which is driven by a Villiers 15 petrol engine.

Another pump, powered by the Ruston & Hornsby 2YBA diesel engine, is mounted on a four-wheel trolley with swivelling front axle and towbar. Designated the RH4XA, this equipment is designed for heavy-duty contract work. A similar 3-in model, powered by the 1 YBA Ruston & Hornsby diesel engine, is under development.

A self-priming 1½-in or 2-in pump powered by a J.A.P. 2SB engine is being included for the first time in the Auto Diesels standard range. It was developed for use by large public undertakings and delivers up to 4,000 gal/hr or 5,000 gal/hr, depending on the size of outlet, or to heads of 65 ft or 90 ft. An automatic throttle control is fitted. Newly included in the special range after having been produced for many years to special order, is the FC4XA model, incorporating a standard 4-in pump flexibly coupled to a Petter PH2 diesel engine with variable speed control. Delivery is at rates of up to 28,000 gal/hr or heads up to 95 ft. The equipment can be mounted on a baseplate for permanent installation or on a four-wheel chassis with pivoting axle and towbar.

Also exhibited were the range of Rapier self-priming pumps, with capacities of 4,000 to 80,000 gal/hr. These units can handle dirty water containing up to 25 per cent solid matter in suspension, and were shown by **Ransomes & Rapier, Ltd.**, Ipswich, on a stand devoted principally to truck mixers and agitators.

Engines

On a stand designed to emphasize the main selling features of the range of rationalized diesel engines of 60-600 b.h.p. produced by the Oil Engine Division of **Rolls-Royce, Ltd.**, at Shrewsbury, the turbocharged units fitted in two new dump-trucks were of major interest.

One was the C8.TFL vertical eight-cylinder engine, type 353, installed in the Aveling Barford SN dump-truck described on page 94 of this issue. With a swept-volumetric capacity of 990·18 cu. in. and a compression ratio of 14 : 1, this direct-injection compression-ignition engine develops 400 b.h.p. at 2,100 r.p.m., gross maximum rating. At these revolutions the fuel consumption is 0·38 lb/b.h.p./hr.

The other supercharged engine, the six-cylinder C6.TFL, is fitted in the FR.6/45 Foden described on page 93. Employing interchangeable components with those of the larger engine, but with six in-line cylinders in place of eight, this unit is of three-quarters the capacity, i.e. 742·64 cu. in., and develops 300 b.h.p. at 2,100 r.p.m.

Another new machine incorporating an engine displayed on the Rolls-Royce stand is the BTD 20 International Harvester (described on page 23 of our January issue). This is a C6.NFR Series 148B normally aspirated six-cylinder engine, developing 210 b.h.p. at 2,100 b.h.p. under normal rating, but derated in the series adapted for the IH tractor to secure greater economy and longer life with maximum torque at low engine revolutions. The four-cylinder diesel fitted in the Vickers 'Vicon'—introduced at the 1956 Public Works and Municipal Services Exhibition and shown again this year as a production model—was included in the display on the Rolls-Royce stand.

The new Four 99 diesel engine introduced by **F. Perkins, Ltd.**, Peterborough, at the 1958 Mechanical Handling Exhibition was again on view. This 34·8-b.h.p. engine, employing an entirely new system of combustion, is described on page 414 of the June, 1958, issue of *Mechanical Handling*.

R. A. Lister & Co., Ltd., Dursley, have extended their range of diesel engines by the addition of a number of single-, two- and three-cylinder units. The air-cooled single-cylinder LDI and two-cylinder LD2 develop respectively maxima of 5 b.h.p. and 10 b.h.p. at 1,800 r.p.m. The single-cylinder SL1, two-cylinder SL2 and three-cylinder SL3 have maximum outputs of 6 b.h.p., 12 b.h.p. and 18 b.h.p. respectively at 1,800 r.p.m. All have C.A.V. fuel pump and injection equipment, with centrifugal governor and fan-circulated air cooling. Designed for higher power applications, the two-cylinder HA2 and three-cylinder HA3 air-cooled engines develop 30 b.h.p. and 44 b.h.p. respectively at 1,800 r.p.m.

Pneumatic Control System for Excavators

The ability of compressed air to provide precise and graduable control of the various motions of an excavator was demonstrated convincingly by a working rig on the stand of **Westinghouse Brake & Signal Co., Ltd.**, Bristol. It reproduced the actions of the control, positioning and auxiliary devices incorporated in a system developed for incorporation in the Priestman 'Lion' excavator, where they would be operated from the driver's cab. Hoisting, slewing, luffing, travelling, crowding and retracting, tripping of the bucket latch, steering, and braking, all came under the pneumatic control system.

Working display of pneumatic control system developed for operation of Priestman excavator (Westinghouse Brake & Signal Co., Ltd.)

Forward and reverse bucket movements and operation of the dipper trip are controlled by a three-position 'Flexair' valve and a similar valve controls the slew and hoist movements. The remaining motions are controlled by 'Pilotair' valves: a three-outlet valve for luffing, slewing lock and travel; a five-position valve for the steering clutches and track brakes, with an on-off valve for the selection of each clutch. These lever-operated valves, six in all, were grouped on a control desk in front of the driver's seat. They were coupled with the appropriate positioning cylinders and clutches, grouped on a display panel, and with compressed air supply, to provide a working demonstration of the entire system.

Visitors could manipulate the various levers, note the convenience of their location and the lightness of their action, and observe the motions they initiated: the engagement and disengagement of the clutches and the movements of the rods in and out of the positioning cylinders.

Hydraulic Transmission Gear

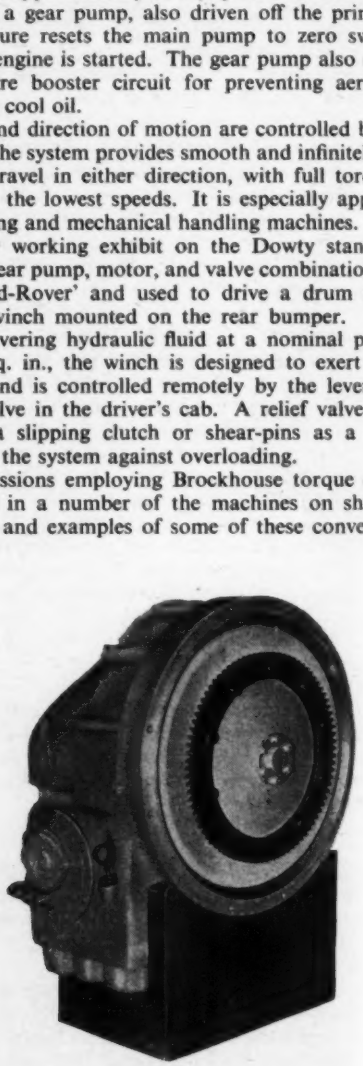
Hydrostatic transmission was featured as the princip exhibit on the stand shared by Dowty Hydraulic Uni Ltd., and Dowty Seals, Ltd., as members of **Dowty Grou Ltd.,** Cheltenham. It took the form of a working demo stration of a system designed to transmit power from t prime mover to the final drive, in place of the conventio clutch and gearbox and, in addition, to provide a means braking the driving wheels that would eliminate friction devices.

Basically, the system, which is the subject of many Briti and foreign patents, consists of a variable-delivery swas plate pump driving a fixed-swash-angle motor, the pum being driven by the prime mover while the motor driv through reduction gearing to the driven mechanism Variation of the pump swash-angle controls the spee and direction of rotation of the hydraulic motor. A bas pressure of approximately 75 lb/sq. in. is maintained in t system by a gear pump, also driven off the prime move This pressure resets the main pump to zero swash-ang when the engine is started. The gear pump also operates low-pressure booster circuit for preventing aeration a circulating cool oil.

Speed and direction of motion are controlled by a sing lever and the system provides smooth and infinitely variab speed of travel in either direction, with full torque tran mission at the lowest speeds. It is especially applicable earthmoving and mechanical handling machines.

Another working exhibit on the Dowty stand demo strated a gear pump, motor, and valve combination installe in a 'Land-Rover' and used to drive a drum and cab recovery winch mounted on the rear bumper. With t pump delivering hydraulic fluid at a nominal pressure 2,000 lb/sq. in., the winch is designed to exert a pull 4,000 lb and is controlled remotely by the lever-operate control valve in the driver's cab. A relief valve takes t place of a slipping clutch or shear-pins as a means protecting the system against overloading.

Transmissions employing Brockhouse torque converte were used in a number of the machines on show at t exhibition and examples of some of these converters we



ABOVE
Power pack, incorporating 1600 torque converter and disconnect clutch for use with engines in the 70-150 b.h.p. range (Brockhouse Engineering Ltd.)

LEFT
Display of the new sintered metal and cerametallic friction materials fo heavy-duty brakes and clutches (Ferodo, Ltd.)

displayed by **Brockhouse Engineering, Ltd.**, West Bromwich. These included one of the 1410 units used with the 'Fordson Major' and the 1150 fitted in David Brown tractors, and also the 1334 model now built into many diesel-engined fork lift trucks. The new 1600 power pack, incorporating a disconnect clutch, was an exhibit of special interest to public works engineers; designed for use with engines in the 70-150 b.h.p. range, it is suitable for earthmoving applications and for fitting in shunting locos, excavators, diggers and cranes.

A feature of the exhibit of **Stein Atkinson Vickers Hydraulics, Ltd.**, London, was a unit of the first size in a new range of Vickers-Detroit high-performance vane-type pumps intended for drive speeds up to 2,000 r.p.m. and working pressures up to 2,000 lb/sq. in. As compared with previous Vickers pumps, it transmits more than twice the hydraulic horsepower though occupying considerably less space. All wearing parts of the pump are incorporated in a cartridge which can be replaced without removing the pump from its mounting.

New Friction Materials

Ferodo sintered metal and cerametallic friction materials made their first appearance at a public exhibition on the stand of **Ferodo, Ltd.**, Chapel-en-le-Frith. Developed principally for clutches intended for duties beyond the capacity of conventional linings and facings, these materials are suitable for use on the master clutches of certain classes of tractors and the steering clutches of crawler-tractors, and can be applied to a great diversity of brakes and clutches.

Operating dry, or immersed in oil, sintered facings are stated to give a consistently uniform performance, with smooth engagement and running-in characteristics, high pressure resistance, cool running and long life. They are available as replacement parts in the form of standardized flat discs or segments on steel cores or backing plates. The cerametallic materials which, with their greater wear-resistance and higher frictional coefficients, are suitable for the heaviest earthmoving applications, are available as circular pads or buttons contained in small steel cups, which are riveted on to the driven clutch plates.

CRAWLER CRANE SPEEDS ROOF CONSTRUCTION

THE FAST hoist-speed, manœuvrability and general efficiency of the NCK 605 crane, with its 90-ft boom, are being practically demonstrated in a new way on the reconstruction of the Albert Dock and Riverside Quay, Hull.

In the re-building of the quay and dockside, which were destroyed during the war, a special method of concrete roofing is being employed for only the second time in Great Britain. Pre-stressed, barrel-vault roofs are being constructed in the erection of four sheds (288 × 80 ft) on the Albert Quay, and three sheds (280 × 79 ft) on the Riverside Quay. This system of roofing dispenses with supporting columns, giving greater floor space for storage.

Work on the contract started in January, 1957, and is now nearing completion, the dock having been re-built almost out of the waters of the Humber, where little more than charred stumps remained. Principal contractors for the British Transport Commission, A. Monk & Co., Ltd., of Padgate, Warrington, have used on the job, for a variety of work, a number of NCK machines made by Newton Chambers & Co., Ltd., of Thorncliffe, near Sheffield.

The fast hoist-speed, the 90-ft boom and the manœuvrability of the 605 in confined spaces, have played a great part in the race to make the most of suitable weather for the pouring of the roof concrete.

Once work has started on the laying of concrete for one of the roof-vaults, it must be completed without being left overnight.

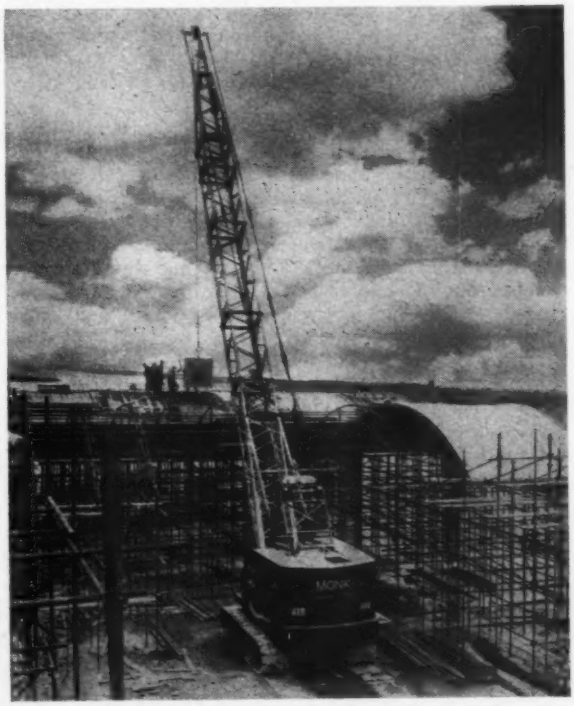
The 605 feeds the spreaders with concrete by the cubic yard, lifting a bucket-load from ground level to the exact location of the work in a few seconds.

The machine easily fills the needs of six spreaders and six finishers employed laying the 3¼-in concrete skin (in the 'valley beams', the thickness of the concrete varies according to fall, but the average is 2 ft 4 in). The larger sheds—on the Albert Quay—have eight vaults, each with a 36 ft span. The other buildings each have seven vaults, each vault spanning 40 ft.

Manœuvrability in the confined space of the Riverside Quay—flanked on both sides by water—is of the utmost importance, and the NCK 605 has solved the problem. It is able to operate 'inside' the buildings, using its long boom over one of the partially constructed walls, to do its work.

Apart from doing all the high-level concrete work, the 605 has also been used in the erection of shuttering, roof lights and steel reinforcement. It has been on the job for seven months without a repair, and it is, of course, readily convertible to dragline work.

An NCK605 crane is seen delivering concrete in 1-cu. yd. bucket for use in the construction of pre-stressed barrel vault roofs at the Albert Dock



DEMONSTRATION

VERSATILE TRACTORS FOR EARTHMOVING

A Report of a recent viewing of latest developments from the David Brown organization

By a Staff Reporter

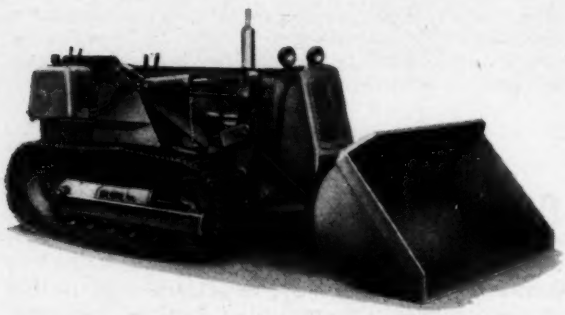


Fig. 1. The new David Brown 50TD front-end shovel, of 1 cu. yd. struck capacity

THE NEW 50TD front-end shovel was among the latest equipment demonstrated by the David Brown Companies at a recent press preview held prior to the showing of the machines at the Public Works Exhibition, a report of which was begun last month and is concluded elsewhere in this issue. The preview took place at the Hanworth Park, Feltham, works of David Brown Construction Equipment, Ltd. Among the other machines on view was a new 4-yd hydraulic scraper, described later in this report.

50TD Front-end Shovel

The 50TD front end shovel (Figs. 1 and 2) is a 50-b.h.p. crawler tractor shovel of entirely British design and construction. Principal dimensions are given in Fig. 2. The bucket is of a full 1 cu. yd. struck capacity, and has a discharge height of 8 ft 3 in. Lifting capacity is 4,000 lb. Shock loads are taken care of by an hydraulic accumulator which functions as a shock absorber, but which may be switched out of action when it is desired to have some 'shake' on the bucket for digging into clay and other difficult materials.

The bucket has a 45-deg roll-back action which ensures full bucket-loads and safe carrying without spillage. Lifting time from ground level to maximum height is 5·6 sec.

The shovel is mounted on the David Brown 50TD industrial crawler tractor, powered by a 6-cylinder direct injection diesel engine with $3\frac{3}{8}$-in bore and 4-in stroke, developing 50 b.h.p. at 1,800 r.p.m. Aternative attachments, which can be fitted in place of the shovel, include 42-in-long forks for handling pallets, etc., and a 96-in-wide dozer blade. The latter can readily be transformed into an angledozer by the insertion of a separate connecting link behind the blade. A $\frac{3}{4}$ cu. yd. capacity heavy-duty bucket, fitted with digging teeth, may also be fitted.

The tractor has a maximum drawbar pull of 12,000 lb (bare machine). Six forward speeds, ranging from 0·945 m.p.h. to 5·31 m.p.h. are provided by a 3-speed twin-range gearbox and there are two reverse speeds of 1·224 m.p.h. and 2·601 m.p.h. respectively. The tracks are provided with modified grouser shoes to reduce the risk of damage to made-up roads or other operating surfaces.

Hydraulic Scraper

Another new machine of special interest was the 4-yd hydraulically operated scraper harnessed to a 50TD industrial crawler tractor. This scraper is of 3·5 cu. yd. struck capacity, 5 cu. yd. heaped capacity, and is claimed to be the first entirely British designed and built hydraulic scraper with positive down pressure on the cutting edge. This is achieved by means of double-acting hydraulic rams which also provide an exceptionally fast 'bowl and apron' technique.

The cutting edge itself consists of a three-piece reversible blade having a total width of 6 ft. The width of the centre section is 3 ft, the end sections each being 1 ft 6 in wide. Positive down pressure on the cutting edge is achieved by two $3\frac{1}{4}$-in hydraulic jacks of 1 ft 8 in stroke, giving a maximum depth of cut of 9 in. The apron lift is operated by a cable which, in turn, is actuated by means of an hydraulic jack of 2 ft 5 in stroke, laterally disposed at the forward end of the scraper. The tailgate is also hydraulically actuated by means of an independent $3\frac{7}{8}$ in-dia jack of 1 ft 11 in stroke.

A view of the scraper being hauled by the 50TD tractor is seen in Fig. 3. The bowl floor size is 6 ft × 1 ft 10 in, the remaining bowl dimensions being as follows: height of sides (maximum) 3 ft; height of tailgate, 3 ft $3\frac{1}{2}$ in; height of apron, 2 ft 10 in; apron opening, 3 ft 9 in.

Among the other equipment on show was a David Brown overshot loader mounted on a special version of the 50TD

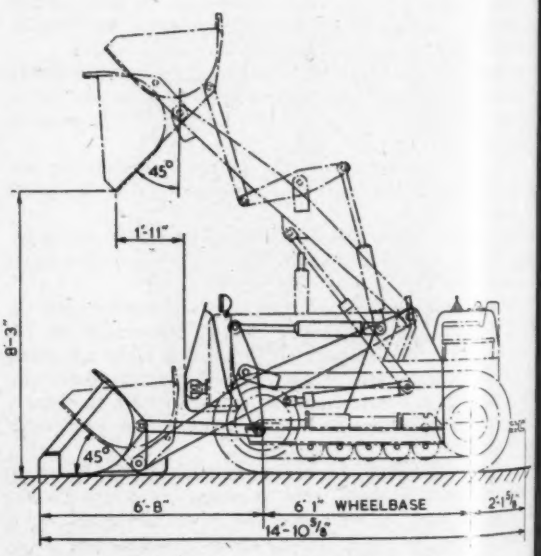


Fig. 2. Leading dimensions of the new 50TD front end shovel

Fig. 3 (Above). A David Brown 50TD crawler tractor with the new 4-yd hydraulic scraper

Fig. 4 (Below). The David Brown ¾-cu. yd. dual pivot hydraulic overloader mounted on a David Brown 900 semi-industrial tractor

crawler tractor. This has a 1-cu. yd. capacity bucket and is capable of discharging at front or rear of the tractor.

All the aforementioned 50-h.p. tracklayer machines are of much stronger all-round construction than previous models and have redesigned hydraulic systems.

The smaller tracklayer in the David Brown range, the model 30TD, also has a six-speed gearbox. With the 4-cylinder engine developing 34 b.h.p. at 1,800 r.p.m., a maximum drawbar pull of 9,000 lb (bare machine) is available. A Boughton model 20 winch, an hydraulic angledozer, and a rear toolbar ripper were shown as examples of attachments that can be fitted to this machine. When an hydraulic dozer is fitted, the same hydraulic system can be used to operate other mounted or towed equipment by adding an additional control valve and/or change-over valve.

From the David Brown range of wheeled tractors, two 900 models were on show, these being of the industrial and semi-industrial type respectively. These tractors have recently been equipped with a more powerful 40-h.p. diesel engine together with 'live' hydraulics and power take-off. The 4-cylinder direct injection engine, with 3⅛ in bore and 4 in stroke, develops 40 b.h.p. at 2,200 r.p.m.

The 900 semi-industrial tractor was seen fitted with the recently introduced ¾-cu. yd. dual pivot overloader (Fig. 4) and a linkage-mounted Barford concrete mixer. This semi-industrial tractor is suitable for a great variety of industrial and civil engineering tasks where statutory road lighting equipment and similar refinements are not required.

The 900 industrial tractor is, unlike the semi-industrial machine, equipped with full-cover mudwings and all the statutory equipment (including lighting) required by the relevant sections of the Road Traffic Act. This tractor has pedal-operated hydraulic brakes on the rear wheels, and an independent parking brake operated by a hand lever. It was shown fitted with the David Brown ¾-cu. yd. capacity industrial front-end loader and Shawnee Scout hydraulic digger as seen in Fig. 5.

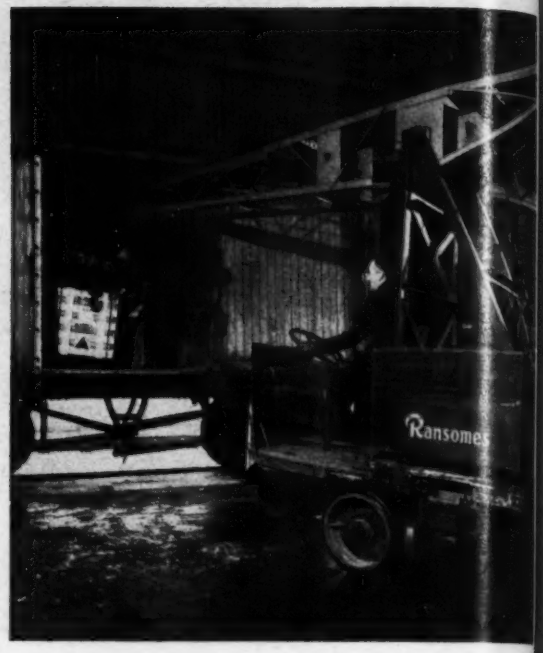
Fig. 5 (Below). David Brown 900 industrial tractor equipped with ¾-cu. yd. front-end hydraulic loader and Shawnee Scout hydraulic digger

DEMONSTRATION

QUICKER FREIGHT HANDLING

By a Staff Reporter

Equipment for the speedy and efficient handling of road and rail traffics was shown at a recent exhibition staged by the British Transport Commission. In this report, a representative selection of some of the principal types of equipment on view is described and illustrated



The searcher jib of this Ransomes runabout crane can probe corners of railway vans and lift up to a ton

THE Freight Transport Exhibition, staged recently at the British Railways' Battersea Wharf goods depot, London, was organized by the British Transport Commission to demonstrate the latest methods and equipment used in the nation-wide freight service offered by British Railways and British Road Services.

Nearly 60 principal exhibits were on show, the largest proportion of these being rail wagons and containers of various types developed especially for certain specific classes of materials. Among them were a number of hopper wagons evolved for bulk material transport. The largest of those at present in service is a 56-ton iron ore hopper wagon. A train consisting of nine of these can carry about 500 tons, and the entire load can be discharged into gantry hoppers within 60 sec. Other special bulk-carrying vehicles have been developed for the transport of materials such as cement, roadstone, and many different kinds of liquids, both by road and by rail.

A B.R.S. bulk grain carrier on show had a capacity of 10 tons. It is built as an articulated unit consisting of tractor and a 'fifth wheel' semi-trailer. The grain hopper can be loaded in 45 min and unloaded in ten. British Railways now have a fleet of 700 vans for the transport of grain; each van carries 20 tons.

A Lansing Bagnall pallet truck unloads a British Railways pallet van. The van has especially wide doors to assist loading and unloading

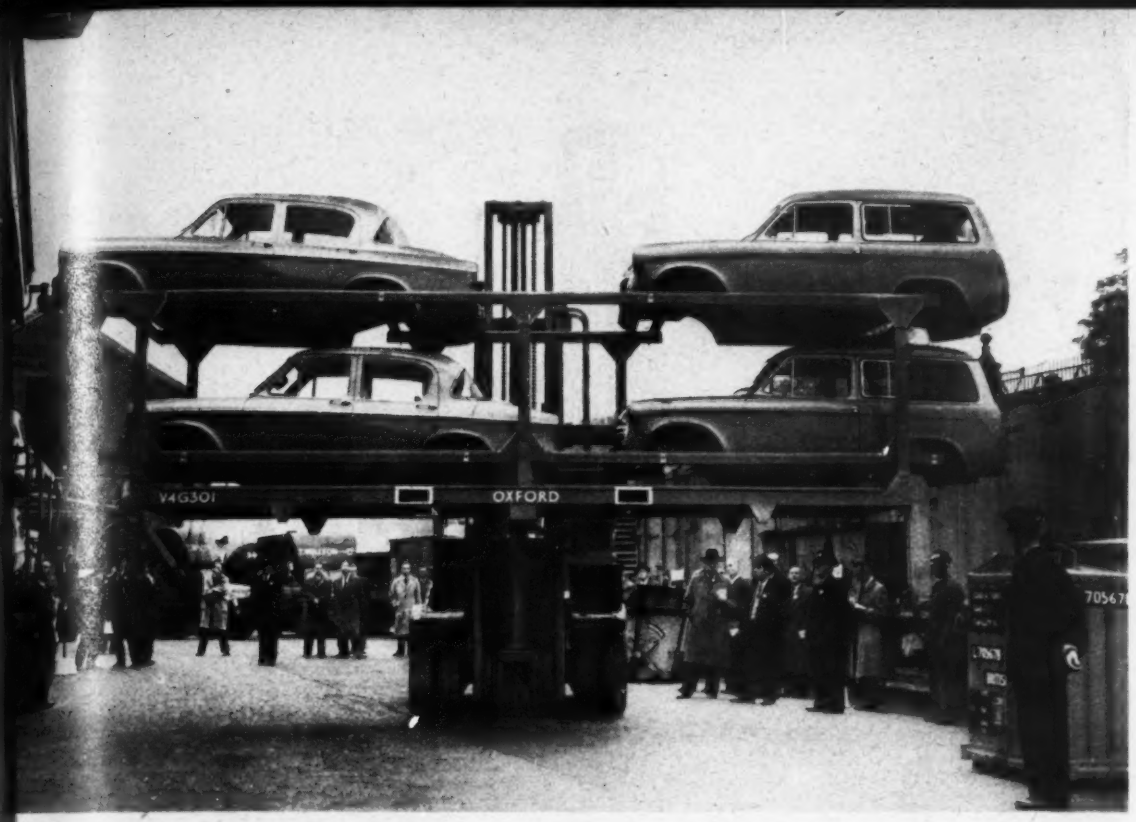
A wide variety of different rail, road, and road/rail containers is now available. There are stated to be over 44,000 containers in service on British Railways alone, with thousands more coming off the production lines. These containers vary from what is virtually an open box, adaptable for many different kinds of goods, to specialized refrigerated containers equipped with eutectic plates which can be charged from firms' own plant.

British Railways are at present experimenting with a new lightweight container which, when empty, can be collapsed within its own dimensions. It is expected that this particular unit will be especially advantageous when empty journeys by sea are involved.

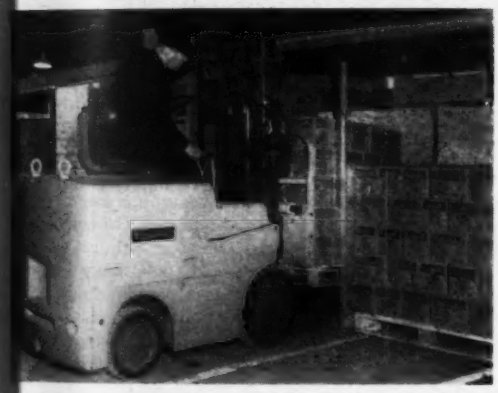
Growth in palletization continues, and British Railways now have nearly 1,500 specially built pallet vans in service with several hundreds more on order. A typical example on show at the exhibition had extra wide doors for easy access by power pallet trucks and similar handling equipment. The van can be adapted to any size of pallet by means of removable partitions and shields, which also prevent movement of the goods in transit.

Vehicles designed especially for the transport of cars or car bodies are operated both by British Railways and British Road Services. The B.R.S. car carrier vehicles exhibited were of two types. One is for delivering vehicles from the factories, and is capable of carrying four cars on two decks. The other is a special pallet for car bodies which can be loaded on to vehicles by fork lift truck.

Designed with the door-to-door transport of unit loads in mind is the B.R.S. vehicle known as the 'Tripad'. This consists of a standard eight-wheeled lorry equipped with a 24-ft platform body made in three demountable sections. Each section is interchangeable, permitting individual sections to be lifted off and replaced by heavy duty fork lift truck at intermediate points or at terminals.



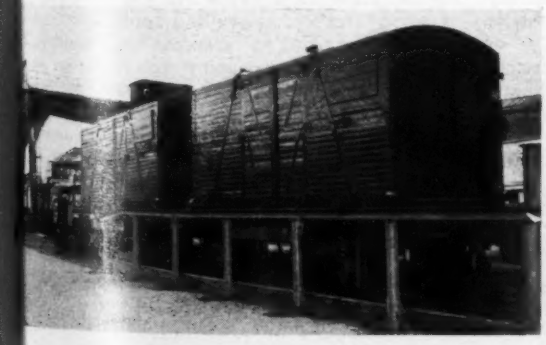
ABOVE
A Shelvoke and Drewry 'Freightlifter' lifts four Hillman car bodies on a special pallet to place them on a road trailer



...se of loading a British Railways pallet van, with wide access doors, is ...monstrated in this photograph by a Stacatruc fork lift truck

Of particular interest was a new device for the transfer of containers between road and rail vehicles. Known as the Penman ramp, it consists of two raised rails with inclined sections at either end which are positioned one at each side of a railway siding. The containers have pull-out metal rollers near each corner. As the vehicle—which may be lorry or rail wagon—moves between the raised rails, the rollers engage with the inclined section of the rails and the container is lifted from the vehicle. This vehicle is then moved away and the second vehicle, on to which it is desired to transfer the load, is backed beneath the container. A hinged flap under the container engages with a batten on the floor of the vehicle so that the motion of the vehicle pushes the container with it along the rails and down the inclined section at the other end where the container settles gently into position on the lorry or rail wagon.

...LOW
...ail wagons bearing containers are seen here being shunted between the ...ils of the Penman ramp. Pull out rollers on the containers engage with ...e rails of the ramp so that the containers are lifted from the rail wagons

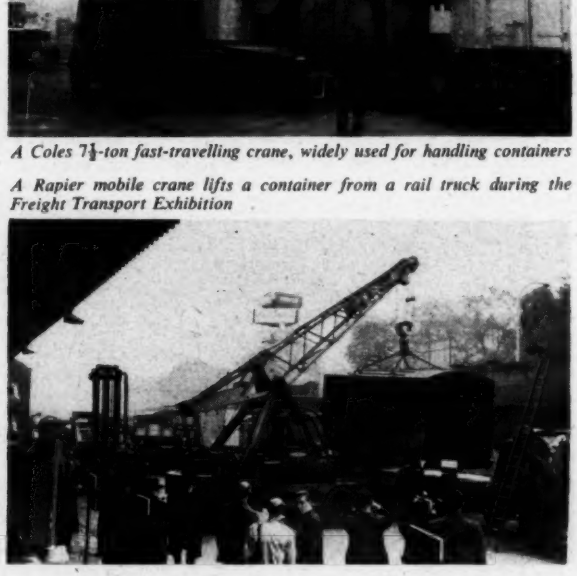


A road vehicle backs beneath the containers on the Penman ramp and, when in position, draws the containers forward until they come to rest on the vehicle deck

ABOVE
The S.D. Freightlifter, with dual driving controls, and capable of lifting loads of up to 8 tons, raises a container from a rail truck during the exhibition

A Coles 7½-ton fast-travelling crane, widely used for handling containers

A Rapier mobile crane lifts a container from a rail truck during the Freight Transport Exhibition



Another method of transferring containers from one vehicle to another is, of course, the use of a crane or a fork lift truck. In co-operation with the manufacturers, British Railways have developed their own 'Freightlifter' fork lift truck. This new version has two alternative driving positions with dual controls as seen in the accompanying illustration. It can travel on roads and, as a fork lift truck, can lift over 8 tons. The machine can also be converted into a mobile crane capable of lifting 6¾ tons, or, with a lifting frame, 7¼ tons. It can also be converted into a 'searcher' crane for removing articles weighing up to 1 ton from the corners of covered wagons. Some fifty of these 'Freightlifters' are now in use in British Transport freight services.

In the space available it is impossible to describe adequately all the various types of equipment on show. In the accompanying photographs some of the principal types of equipment seen at the exhibition are illustrated. Limited though they are, these photographs will give some idea of the very extensive range of specialized appliances now in use or under development, for speeding the handling of freight both by British Railways and British Road Services. Much of this equipment has been developed specifically for the quicker transference of goods from road to rail vehicles and vice versa, and for the improvement of door-to-door service. For both road and rail services, stress is now being laid by the British Transport Commission on quicker handling of traffic at terminal and transfer points. The Commission states that one of their constant objectives is to 'offer transport services which can be regarded as an extension of the industrial production belt'. A worthy aim—and one which, on the evidence of this exhibition, has already been attained for many classes of materials.

CORRESPONDENCE

To The Editor '*Mechanical Handling*'.

Dear Sir,

Proving the B.I.T.A. Stability Test.

It is interesting to note from the article in the December issue of your journal, that K. Mumby, considers it a matter of congratulation that B.I.T.A. has decided to adopt and implement, by January 1960, the 'American' ratings for fork lift trucks (against the opinion of many users and others).

Mrs. Mumby gives four reasons why we should accept the new rating. May I be permitted to give four other reasons why many users will not agree with her?

1. The test No. 1 is not conclusive or at least not for trucks fitted with a forward tilt mechanism. Would the truck tested have remained stable if the tilt motion had been operated to the full three degree forward movement?

2. American standards of safety are, in many instances, below those pertaining in this country. The necessity for these higher standards may be a matter for debate but surely not whether we should produce and sell equipment for use in this country that does not comply with the existing standards of safety.

3. Export ratings of fork lift trucks could line up with 'World opinion'. Internally, however, we require trucks that are inherently safe under any acceptable condition of loading. If a truck is fitted with forward tilt it should still be safe when this is at maximum position.

4. It is misleading to suggest that longitudinal and lateral stability factors are conflicting. Agreed, the position of the longitudinal centre of gravity affects the lateral stability but so do other points in the design of the trucks. Stability factors, as such, cannot conflict.

I do not find it 'inconceivable' that we should wish to 'retain a known safety factor'. Perhaps Mrs. Mumby would explain what she and B.I.T.A. would 'pin their faith to' in an endeavour to prevent a truck toppling over if the B.I.T.A. rated load was lifted to maximum lift and the forward tilt was then moved to the usual three degrees maximum or how she suggests that users prevent this happening if an enthusiastic fork truck operator decided to demonstrate his truck's capabilities to an admiring bunch of colleagues.

In my opinion, all the tests are acceptable and desirable except test No. 1 and here the angle of the table should exceed the angle of the maximum forward tilt of the truck by an agreed percentage.

Yours faithfully,

J. R. MUNDY,

Engineering Division

Courtaulds, Ltd., Coventry.

Mrs. Mumby replies:

To take Mr. Mundy's objections in the order in which they are raised:

1. Test No. 1 establishes incontrovertibly the condition specified: that with mast fully laden, vertical, and at maximum elevation, the truck shall remain stable when tilted forward to an angle of 2·3 deg. This is a more severe test than the tilting of the mast alone and was designed, like the other tests, after four years of research into accident records.

2. It would, in my opinion, be more accurate to say that American standards of safety tend, in general, to be more realistic than ours. For many years we were able to afford wide unused margins of safety—as, for example in our building and civil engineering structures—but realization is now pretty general that those halcyon days are over.

In debating the nature of the equipment 'we should produce and sell', Mr. Mundy seems to be confusing the sales and manufacturing policies of the manufacturer with the responsibilities devolving upon national safety organizations. His words also appear to convey an implication that the B.I.T.A. are seeking to disregard existing safety standards and such an assumption would be entirely unwarranted.

In this country, there *is* no national standard for fork truck stability. In Europe there is a standard and one that will almost certainly be accepted in America also. Under these circumstances, British manufacturers would appear to be acting both reasonably and realistically in designing to satisfy the international standards.

3. That being so, we might substitute the counter-proposal that home ratings could line up with those of the British Standard, if and when it was established.

To return again, with Mr. Mundy, to the question of forward tilt, the conditions he prescribes are comparable with an insistence that the hydraulic suspension fitted in the Citroen car would be safe only if one could take a corner at full speed with the body raised to maximum height. If it is to mean anything at all, an 'inherently safe' condition must be related to normal and proper use, and no operator could have the slightest difficulty in grasping the proper and improper uses of forward tilt.

4. The conflicting requirements of the longitudinal and lateral stability factors may be stated in the crudest terms by pointing out that one can raise the percentage overload that the truck will take without tipping by increasing the counterweight to the point at which the machine starts to tipple backward, but the more weight one hangs on the back of the truck the more one impairs its lateral stability. Though omitting many factors, this gross over-simplification does emphasize the importance of establishing stability standards at an early stage in the design and the inadequacy of re-rating as a substitute for the correct design bases.

In his penultimate paragraph, Mr. Mundy seems to suggest that 'known' safety factors are sacrosanct, whereas history teaches us that they are constantly being modified in the light of experience—for example, the lengths of runways in relation to the speed of aircraft have been reduced, and the permissible safe speeds of heavy commercial vehicles have been increased. The stability factors now under discussion are based on the analyses of accident records over a four-year period.

His further suggestion that safety standards should be considered in the context of the irresponsible operator is not, one assumes, intended to be taken seriously; if it were, our industrial tools would become too cumbersome to survive.

7e SALON INTERNATIONAL DE LA MANUTENTION

Examples of some of the mechanical handling equipment displayed in Paris

An exterior view of the partly finished exhibition hall

In Paris in November (too late to be reported in our December issue and held over from our January contents) was held the 7th Exhibition in the French capital at which mechanical handling equipment was shown. This exhibition was held in a new exhibition building, a photograph of which is shown on the left. The accompanying illustrations show some of the equipment of interest to readers of this Journal.

For the address of manufacturers of any equipment shown here, approach should be made to the Editor of *Mechanical Handling*.

Harbilt tractors and industrial power trucks on the stand of Olcoven

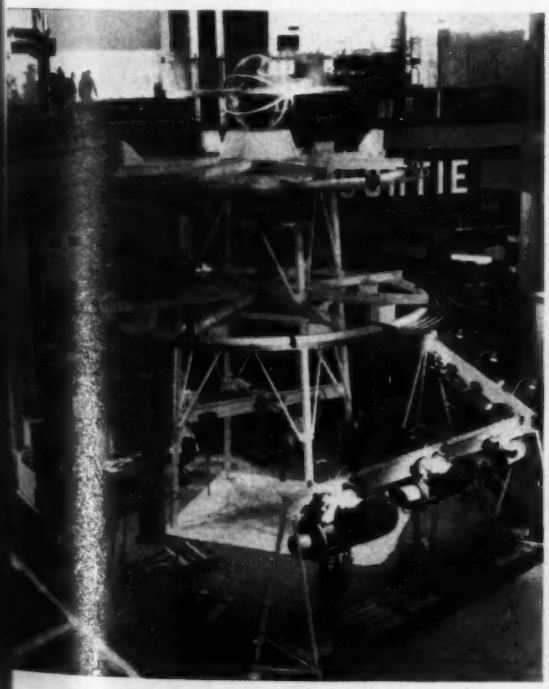
BELOW
In the foreground is shown a section of the Teleflex stand. In the background can be seen an overhead crane which serves this bay of the exhibition hall

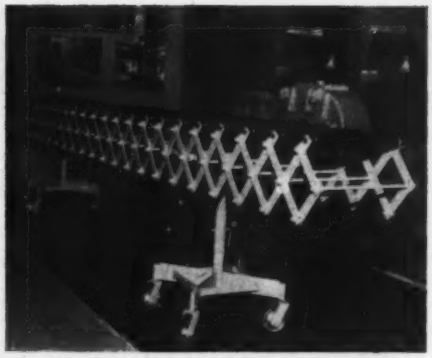
An interesting type of conveyor showing a junction, exhibited by Burton Fils

ABOVE: *A mobile crane shown by Bondy*

BELOW RIGHT: *A view of the stand of Felco-France showing a selection of their hoists*

BELOW: *One of the stands of Fenwick S.A. showing their overhead hoists. This company had another stand showing fork lift trucks,*

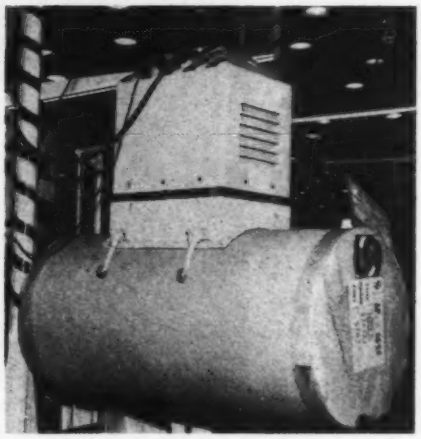


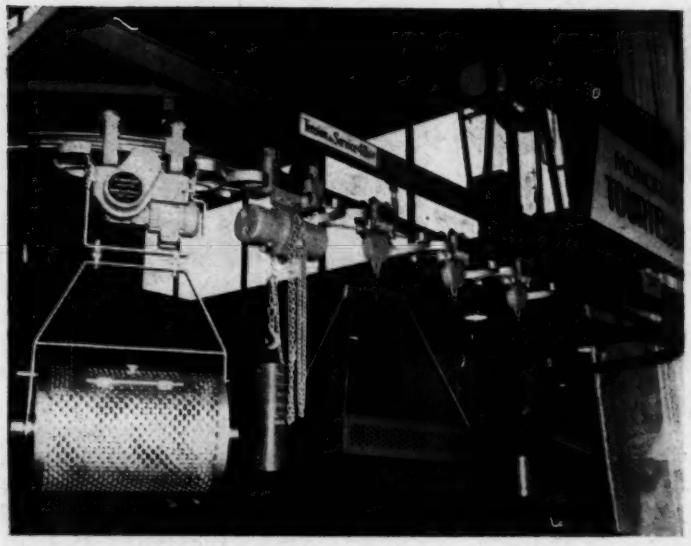


A telescopic roller conveyor exhibited by Simplex

Two examples of pallets exhibited by MacGregor Comarain S.A.

BELOW: *A Jules Roy paper hoist displayed by Ets. Saxby*





A section of the overhead conveyor shown by Ets. Tourtellier

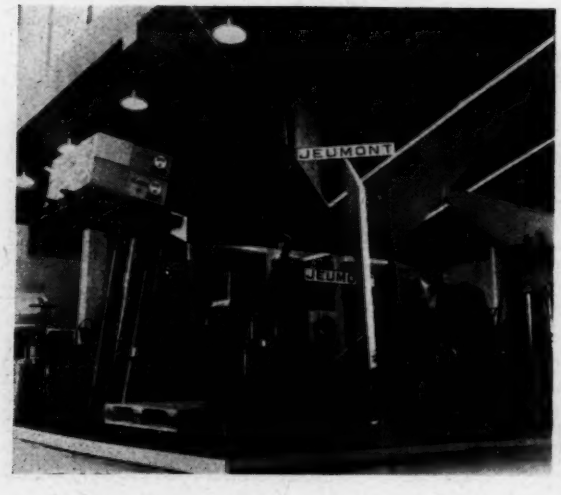
Mobile boom conveyor with an overhead conveyor in the background shown on the stand of S. mefi

BELOW
A Yumbo mobile crane

LEFT
A section of the overhead conveyor shown on the stand of Berthelat et Fils (Agents for Geo. W. King, Ltd.)

BELOW LEFT
Lansing Bagnall trucks on the stand of Forges & Ateliers de Constructions Electriques de Jeumont

BELOW
A Jones mobile crane and a Weatherill loader shown on the stand of Groupe Major J. R. Crampton



NEWS OF PERSONALITIES

Norman Devonport

H. N. Wood

Ralph D. Hunt

D. C. Lorkin

Colonel E. G. **Angus,** who has been chairman and managing director of George Angus & Co., Ltd. since 1933, retired from his position as managing director on December 31st. He will continue as chairman.

Several changes in the senior management of the company will ensue as a result of Col. Angus' retirement from his position as managing director, and these took effect from January 1st, 1959.

Sir Walter **J. Drummond** has become an additional deputy chairman. The other deputy chairman is **G. A. Bowerby.**

Two managing directors have been appointed in Col. Angus' place: **D. Drummond Angus** becomes managing director, general divisions (which covers all departments other than engineering divisions). A great-grandson of the founder of the company, he has been a director since 1929 and sales director since 1950.

A. Procter becomes managing director, engineering divisions which embraces oil seal and gear divisions. Mr. Procter has been a director since 1953.

D. E. F. Canney, a director of George Angus & Co., Ltd. since 1953 and managing director of Telemite, Ltd., becomes chairman of that company. He is also Executive Vice-president of George Angus (Canada), Ltd.

In order to streamline their outside representation Fielden Electronics, Ltd., have formed three new sales divisions: London, the north-east and the midlands. Appointments recently made in these divisions are as follows: **R. Speller,** after three years as company representative in London north, becomes manager of the London sales division. **F. G. Totty,** formerly Yorkshire representative, becomes north eastern sales division manager, based at Stockton. **F. B. Price,** for many years Fielden representative in the midlands, assumes the management of the midlands sales division.

E. Cars has joined the board of the Moss Gear Co. Ltd., Tyburn, Birmingham 24, as works director, in place of **A. W. Macferson** who is relinquishing this position to take over the duties of sales director.

Norman Devonport has resigned his position as manager of the Midlands Division of Materials Handling Equipment (Great Britain), Ltd., to form his own company, incorporated as Devonport Machinery Co., Ltd., 96 Warwick Street, Leamington Spa, Warwickshire. The new company will operate within a 75-mile radius of Leamington Spa and will offer a free advisory service on handling methods and equipment. They will also act as distributors for leading manufacturers in the specialized mechanical handling field and have been appointed sole agents for Materials Handling Equipment (Great Britain) Ltd., in the Midlands area.

David M. Jinks, a director of Cleco Electric Industries, Ltd., Leicester, was married recently at St. Mary's Church, Wighton, Leicester, to Elizabeth Margaret (née Fendick).

The North British Rubber Company (affiliated to United States Rubber Company) of Edinburgh and Dumfries, announce that the board of directors have elected **Ralph D. Hunt** a director effective January 1st, 1959, and appointed him deputy managing director assuming full responsibility for sales and marketing.

P. A. F. Fuller has joined Dewhurst & Partner, Ltd., the automatic electric control gear specialists, as manager of their components division. Both during and after his service with the R.A.F., Mr. Fuller gained wide experience in his field and recently left Electron (London), Ltd., where he was sales manager, to take up his new position. Mr. Fuller will be responsible for the sales of Dupar electric control components as distinct from the control panels, desks, starters and other installation equipment manufactured by the same company. He will be based at the head office in Hounslow.

It is announced by Bennis Combustion, Ltd., that **J. S. A. Hodge, F.A.C.C.A., F.T.I.I.,** has been elected chairman of the company and **B. W. Dawkins** has been appointed managing director. **C. J. Hereford, M.I.H.V.E., M.Inst.F.,** has been appointed a director of the company.

The board of directors is now constituted as follows: J. S. A. Hodge, F.A.C.C.A., F.T.I.I. (chairman), B. W. Dawkins (managing director), N. C. Crighton, A.M.I.Mech.E., M.Inst.F., E. L. Hollinshead, C. J. Hereford, M.I.H.V.E., M.Inst.F.

Hugh Nicholas Wood, founder and chairman of Hugh Wood & Co., Ltd., was awarded the O.B.E. in the New Year's Honours List. Mr. Wood, whose firm have been responsible for many important and interesting installations of mechanical handling equipment, is now on his way to Australia in the interests of the export business.

Robert Dempster & Sons, Ltd., of Elland, Yorks., announce that **H. J. Tinkler** has been appointed sales engineer in their London office, 57 Tufton Street, Westminster. This appointment follows the resignation of S. Langford.

Lancashire Dynamo Holdings, Ltd., announce the appointment of **D. C. Lorkin, F.C.I.S.,** previously joint managing director with S. F. Steward, C.B.E., as the managing director of the company.

This appointment is consequent upon Mr. Steward's resignation of the position of joint managing director of the company and his appointment as director-designate of B.E.A.M.A. Mr. Lorkin joined Lancashire Dynamo & Crypto, Ltd., in 1932; becoming a director in 1946 and managing director of L.D.C. in 1951, a position he still retains. It will be recalled that Lt.-Col. G. S. Marston, D.S.O., M.C., became chairman of the company in August last year.

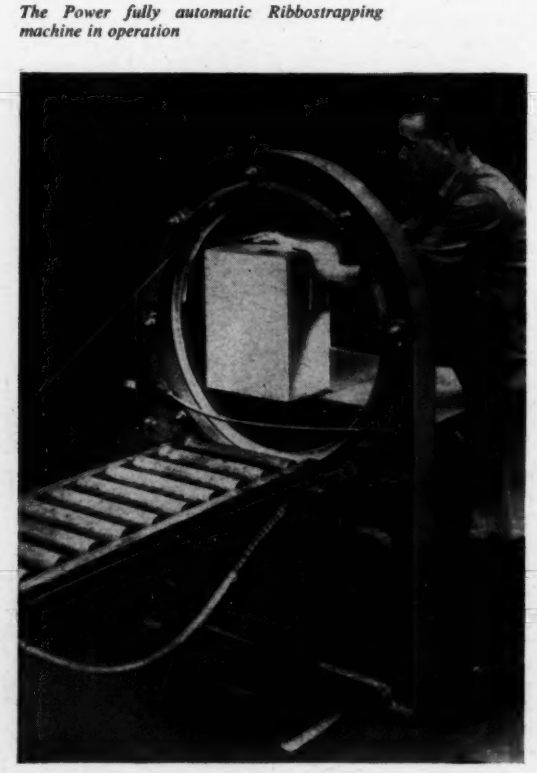
REVIEW OF NEW EQUIPMENT

FULLY AUTOMATIC RIBBOSTRAPPING

Entirely new in its application, the Power automatic Ribbostrapping machine is a development of the well-known Power fully automatic wire machine which has been in continuous production for over 20 years by Power Strapping Systems, Ltd., formerly Fredk. A. Power & Sons (Box Strapping), Ltd., Landor Street, Birmingham, 8.

The machine is entirely automatic and can handle a continuous flow of wooden boxes or cartons of all sizes at approximately 25 ties/min by the pressing of a pedal. The straps are automatically placed under tension around the packages, and the machine is thus very suitable for reinforcing fruit trays, mineral water and beer crates and other similar containers on which the flat section wire lies snugly, proof against rough handling. Tension is adjustable and, once set, every strap is applied squarely and at identical tension, thus eliminating the disadvantages of the human element. The machine is quite self-contained, and installation merely means connection to electric power. All interior parts run in oil, while exterior parts are automatically oiled by a force-feed lubrication pump. The new model is supplied on the rental system, and a complete maintenance service on a nation-wide footing is provided.

The Power fully automatic Ribbostrapping machine in operation



BALL BEARING SLEWING RINGS

As ball bearing slewing rings, applied to slow-rotating and slewing machinery, have no centre pivot or nut, not only are all adjustments eliminated, but the central space is free to be used for other components and provides ready access to places otherwise reached with difficulty. These advantages are offered by two types of Roballo slewing rings manufactured at Crown Works, Sunderland, and marketed exclusively by the Roballo Engineering Co., Ltd., 43 Dover Street, London, W.1.

One type of ring has a single row of balls and two ring components, and the other a double row of balls and three ring components. The former is intended mainly for taking up radial loads and axial loads up to about 10 tons combined with small tilting moments. The main feature of the double-row design is the collar ring that absorbs high axial and radial loading and very large moments of force.

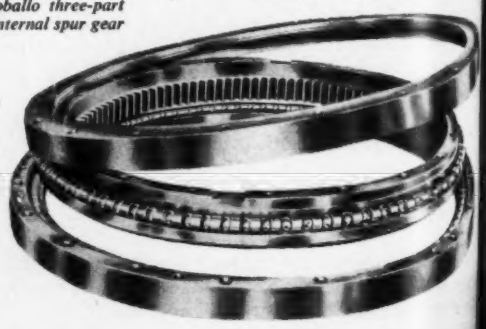
The components are of forged steel with surface-hardened ball races. The loads are carried by precision steel balls separated by intermediate balls, spacers of special design or by a cage. A toothed ring is machined into one of the rings to accept drive for rotating motion. This may be a spur gear with internal or external teeth or worm or bevel gear. The pitch and face width of the teeth can be varied as required. The inner and outer rings are mounted on the adjacent framework with steel bolts uniformly spaced about the periphery. Accurate centring of the inner and outer rings ensures precise operation and close meshing of the gear drive. Seals, not normally necessary, may be fitted to exclude dust or other foreign matter. Lubrication is by grease gun or a centralized system.

The rings can be manufactured economically in diameters up to 13 ft or more, and the large number of supporting balls withstand axial or thrust loads up to 2,500 ft/tons. Larger loads are carried on segmental slewing rings, which can be made up to 45 ft in diameter.

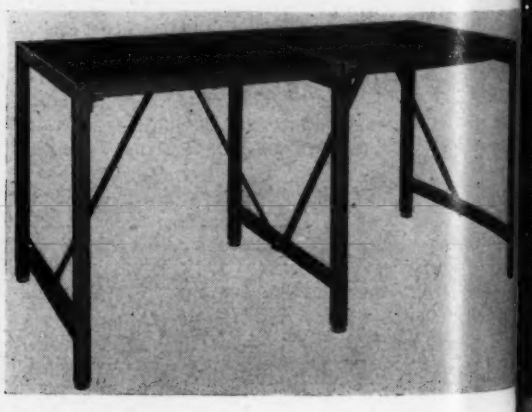
The Roballo rings are particularly suitable to carry high axial loads and tilting moments with slow or intermittent rotation. With no centre pivot they can be installed with low mounting height, important for mobile equipment requiring a low overall height, or for rail-mounted equipments restricted by loading gauge.

(*continued on page* 115)

Exploded view of a typical Roballo three-part ball bearing slewing ring with internal spur gear



Unit-constructed work table. Made by Farrow & Jackson, Ltd., 4[illegible] Prescot Street, London, E.1, the unit-constructed work tables seen here are 2 ft 9 in high × 2 ft 9 in square, making up into any multiple of [illegible] 9 in. Tops can be in a variety of materials according to specific needs



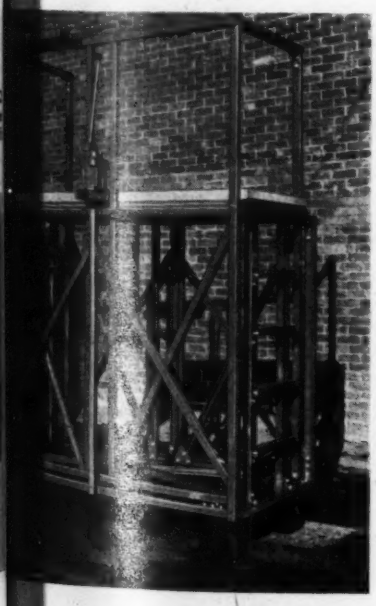
The ability to carry a high tilting moment on a small diameter is particularly useful where space is restricted or where a heavy counterweight or a large tailswing is inadmissible. These rings are also employed to great advantage in charging machines, swivelling loaders and stackers welding positioners, bogies for rolling stock, windmill plant, rotary furnaces and rotating hoppers.

AIRCRAFT MAINTENANCE STAND

For servicing Scimitar fighters, the Admiralty are to use hydraulically operated aircraft maintenance stands of 10 cwt load capacity, made almost entirely of Unistrut standard steel channel by the Unistrut Division of Sankey-Sheldon, Ltd., 46 Cannon Street, London, E.C.4. Overall dimensions are: 8 ft 10⅛ in × 6 ft × 3 ft 3¾ in, height of working platform in the down position, 6 ft ⅛ in, size of platform, 6 ft × 2 ft 6 in. The lift of 2 ft to 8 ft ⅛ in is achieved in approx. 65 sec by hand pump operated from the platform. Fall is gravitational.

Two built-in ladders act as guides when the platform is raised or lowered, the channel forming the inner frame ladder stringer riding against that of the outer frame ladder. Two removable end rails facilitate working against aircraft, etc., or allow several stands to be linked together. The platform floor is of Q grating topped with non-slip carborundum squares. To prevent damage to aircraft, the working side and both ends of the stand are faced with ¼-in rubber strip. For safety, all working parts are within the inner frame and steel closer strip keeps out dirt and oil from channel opening upwards or outwards. The stand is easily moved into position being mounted on four 8-in × 2½-in dia castors which can be locked by swivel and brake.

One of the new hydraulically operated aircraft maintenance stands to be used by the Admiralty for servicing Scimitar jet fighters



GAS CYLINDER TROLLEY

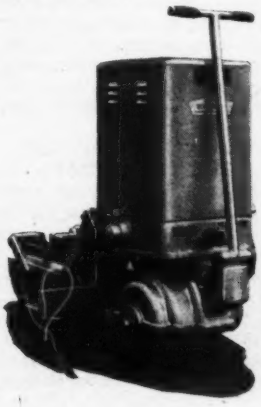
Another recent addition to the Powell range of handling equipment is a gas cylinder trolley. Robustly constructed of tubular steel, it will carry two cylinders of up to 12 in dia in a well-balanced position without need for securing chains. A hand-operated sprag permits easy loading and unloading. Fitted with two 16-in dia main wheels and an 8-in wheel in the rear swivel castor, the trolley is easily manœuvrable for outdoor or indoor use. A welding rod holder is also supplied. The trolley can be obtained with rubber-tyred or all-steel wheels. Single cylinder trolleys are also available. Manufacturers: Powell & Co., Burry Port, Carms, South Wales.

Two 12-in gas cylinders can be carried by the Powell tubular steel trolley

POWER TRACTION UNIT

For the propulsion of stackers, pallet trucks, bins, etc., and for use generally as a power-operated tug for any load up to 2,000 lb, the Hydriver electric power traction unit has been introduced by R. H. Corbett and Co., Ltd., Hydrum Works, Burgess Hill, Sussex. It consists of a 12-V D.C. motor, driving through reduction gear a Duthane-tyred wheel and an aluminium body and cover carrying a Burfield battery in a sheet metal case. Forward and reverse are controlled by the handle. It can be attached for handling wheeled bins without any alterations or fitting. An adaptor plate is bolted to a stacker for attachment and the Hydriver is held in position by two steel locking pins.

A Hydriver traction unit fitted with a tug for handling wheeled bins



Light weight is a practical advantage of the Powell aluminium alloy barrel skid

ALUMINIUM ALLOY BARREL SKID

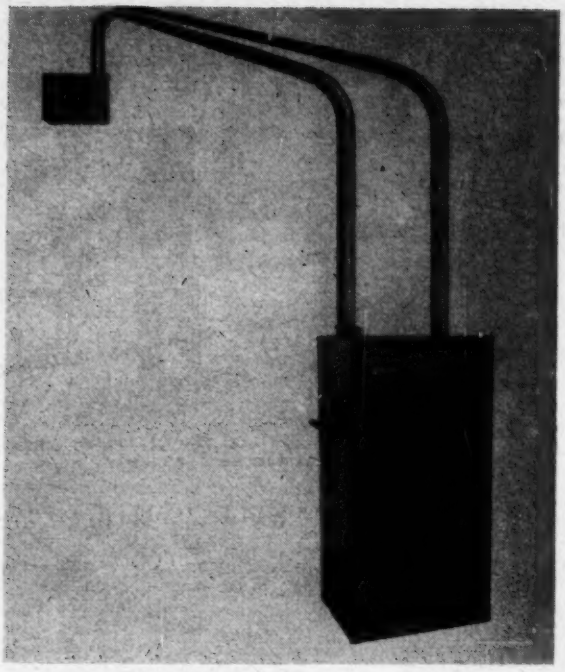
Particularly suitable for loading and unloading metal drums, wood barrels, cylinders, etc., a new aluminium alloy barrel skid, combining strength with lightness and made to an exclusive design and specification, has been introduced by Powell and Co., Burry Port, Carms, South Wales.

Available in three standard lengths of 8 ft, 10 ft and 12 ft, the new skids are only half the weight of steel skids of equivalent length and capacity and can be safely and easily handled, thus reducing the risk of accidents. The runners have wood battens positioned along the top of the steel section and these can easily be replaced if worn. Steel hooks are fitted.

A standard fibre-glass reinforced plastics hand truck recently developed by White Child and Beney, Ltd.

FIBRE-GLASS PLASTICS TRUCKS

Of special interest to dyehouses, laundries, manufacturers of chemical products and many other trades is the introduction, by White Child and Beney, Ltd., Sheply Works, Audenshaw, nr. Manchester, of newly developed fibre-glass reinforced plastics hand trucks. These are said to combine for the first time modern functional design, materials with very high impact strength and chemical resistance and a high-class finish at a cost substantially lower than has previously



Cabinet, tubing and Pneu Art terminal of the new Lamson Cabinet Junior document-handling system

The new Yale 3-t n electric low-lift platform uck

The K.A.M. brushing unit for cleaning conve belts

been possible. Swaged ends and a dished base, perforated if required, facilitate speedy drainage and add greatly to the strength of the truck, while the porcelain-smooth inside surface is easily cleaned and completely snag-free. Flat-bottom trucks are also available.

The rust-inhibited, all-steel chassis is tested up to 5 tons and is carried on three axles for two fixed and two sliding wheels, this arrangement being generally accepted as giving the greatest manœuvrability. Any size and type of wheel can be fitted to suit particular conditions and a wide range is available. The sizes of truck offered are at present 36 × 24 × 24 in deep, 54 × 30 × 24 in deep and 66 × 30 × 27 in. deep.

QUICK HANDLING OF DOCUMENTS

For use in small offices and factories where rapid conveyance of paper-work, small parts, tools, cash, jewellery, etc., is required over distances not exceeding 150 ft the Lamson Engineering Co., Ltd., Hythe Road, London, N.W.10, have recently introduced the Cabinet Junior airtube system. The power unit comprises an electrically driven turbine connected to a fractional h.p. motor, suitable for a 200-240-V single-phase 50-cycle supply, mounted with other components in a cabinet 36 in high, 20 in wide and 15 in deep and lined with sound-absorbing material. The outstation can be of the Pneu Art Terminal type, recommended for quietness as the carrier is discharged within this and then removed by hand. Alternatively, a double-door terminal can be provided to discharge the carrier into a chute. The tubing is 2¼ in outside dia, supplied in 12-ft lengths, with curves of 36 in radius, sleeve-type joints and supported by brackets and hangers. Plastic tubing and curves can be supplied at extra cost.

To operate, a small lever is pulled forward with the left hand, to start the motor and set the time switch, and the loaded carrier is inserted into the sending terminal. On release of the lever the carrier travels to the receiving station. The motor is then automatically switched off, unless another carrier is being sent, in which case the unit is automatically re-timed and stops only when all carriers have arrived at their destination. The despatch of carriers from the outstation is equally simple. With each system are provided four carriers of varying sizes, of the side-opening, end-opening and open-ended with spring types, in aluminium, brass and transparent material.

LOW-LIFT ELECTRIC PLATFORM TRUCK

For long-haul, inter-factory movement of loads up to 3 tons, a new Yale electric low-lift platform truck is now available with 3-speed control, a top speed under load of 5 m.p.h. and a comfortable seat for the operator. It is a development within the Worksaver range and may be pedestrian controlled or ridden. Being equipped with fully protected front and rear lighting, it can be used on public roads. Battery capacity is sufficient for continuous operation throughout an 8-hr shift, and where round-the-clock working is necessary, a discharge battery can be replaced in a matter of minutes. Various widths and lengths of platform can be supplied to most applications.

Manufacturers are the Yale and Towne Manufacturing Co., British Materials Handling Division, Wednesfield, Wolverhampton, Staffs.

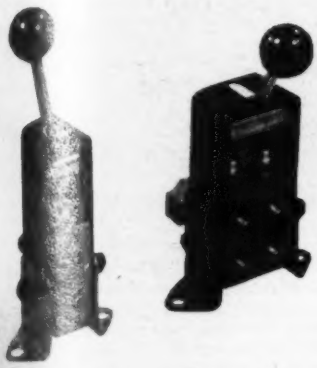
FOR CLEANING CONVEYOR BELTS

The K.A.M. brushing unit, a development of the Kez-strip conveyor belt brush, manufactured by the Kleen-e-ze Brush Co., Ltd., Hanham, Bristol, has been reduced in price, irrespective of size or type. Its successful use in many branches of industry handling a wide variety of materials, including coal, coke, iron ore, glass fragments, concrete slurry and sinter, has led to such demand that bigger quantity buying with streamlined production has lowered the cost.

The K.A.M. can be easily installed on existing fittings, generally with only four bolts. A 3-phase, 50-cycle Engl Electric totally enclosed motor drives the brush, and for use in mines, etc., a flameproof unit, which complies with H.M. regulations, can be supplied. In ordinary circumstances, however, the units are so safe that they require little or no guard.

(*continued on page 117*)

The brushes used are very efficient and hard-wearing and one user reports that after 4,000 hour running at 100 tons an hour, a brush shows no appreciable signs of wear.



Single and twin lever-operated Martonair control valves

MIDGET CONTROL VALVES

A new range of inexpensive and compact ¼-in B.S.P. 3-port poppet control valves in 22 styles has been put into production by Martonair, Ltd., Parkshot, Richmond, Surrey. There are two versions: the normally open S.256D and normally closed S.256C. A variety of operating mechanisms supplied comprises push-button, for panel mounting, shrouded push-button, mushroom push-button, two-position switch and rotary switch, two-position lever for universal mounting, plunger-, roller-, pressure- and solenoid-operated and solenoid-operated timer. The solenoid-operated two-position lever and timer valves are also supplied in 5-port versions and a wide range of legend plates for panel-mounted valves is available.

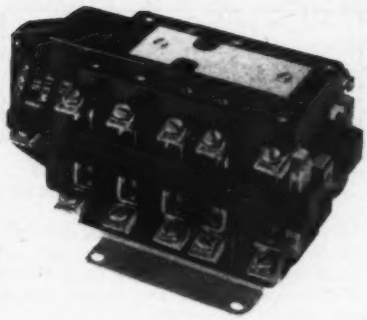
INDUSTRIAL ELECTRIC TRUCK

Capable of hauling a 10-ton trailer payload at 3-4 m.p.h. and running light at 6-7 m.p.h., the recently introduced Wrigley E1000 industrial electric tractor will exert a continuous drawbar pull of 500 lb and a momentary pull of 3,000 lb. It has a 48-V D.C. totally enclosed series-wound motor, driving through a short propeller shaft with two Layrub universal joints and bevel gear differential to a double-reduction back axle. A four-stage controller is pedal-operated, with manually operated forward and reverse, automatic anti-plugging device, master switch with removable key and deadman pedal for the left foot. Four-wheel hydraulic brakes, 8 in front, 11 in rear, are pedal-operated, with independent mechanical hand parking brake. Other chassis features are pneumatic-tyred steel detachable wheels, semi-elliptic front and rear springs, full-lock Ackerman front-wheel steering, with roller-bearing kingpins and front- and rear-towing hitches with 1-in pins. The heavy steel-plate body has a radiused front corner steel footplate, hinged lid for easy battery inspection and removal, lifting eyes front and rear and a full-width front steel bumper. Weighing approximately 45 cwt, including batteries, the tractor measures 6 ft 8 in long, 3 ft 6 in wide, 4 ft 9 in high overall, has a 35-in wheelbase, 3-ft track, turning circle of 14 ft 6 in outside and 4 ft 6 in inside and 4½-in clearance under the rear axle.

The Wrigley E1000 industrial electric tractor with trailer

INDUSTRIAL CONTROL RELAYS

Square D, Ltd., 100 Aldersgate Street, London, E.C.1, have introduced a completely new range of industrial control relays, designated Class 8501 Type D, covering a wide range of contact arrangements from two to 10 circuits. Very compact design in combination with heavy-duty industrial construction is an outstanding feature, making them particularly suitable for automation control systems typical of many machine tool and other industrial machinery control applications. All models are rated for 600 V A.C. duty with 10amp current-carrying capacity and mechanical duty capabilities are in excess of the most severe category in B.S.775: 1956, i.e. Mechanical Duty Class IV.



A five-circuit industrial control relay in the new range introduced by Square D., Ltd.

To facilitate easy and rapid control-panel mounting and wiring, the mounting hole dimensions on the baseplates for all relays in the range are identical, namely 2⅛ × 2¼ in, so that only one template need be used for all panel drilling. All terminals are provided with positive pressure connectors for fast wiring without need for special tools, looping of wires or special connectors and are completely accessible from the front. Silver-to-silver, double-break contacts, incorporating self-wiping action, are clearly visible for inspection without removal of any parts, and by loosening two screws a relay can be completely disassembled and serviced without removal from its panel mounting. For longer life, moulded coils are used, being less susceptible to mechanical damage, operating cooler and having a much lower rate of moisture absorption than the older tape-wound type commonly used in relays and contactors. As for the contact terminals, positive pressure connectors are used on coil terminals.

MARCH

The above issue will contain, amongst others, the following articles:

Mechanized Paint Shop for Motor Vehicles

Package Handling

and usual features

TRADE NOTES

Incorporated Plant Engineers Move to London

In a statement to the press at the institution's new London headquarters at 2 Grosvenor Gardens, S.W.1, the president of Incorporated Plant Engineers explained the reasons underlying the decision to move up from the Midlands and showed that it marked an important stage in the progress of a professional association that had originated during the second world war.

Since the memorandum of association was signed in 1946, the institution's rate of growth has been remarkable. By 1945 there were 18 branches in the United Kingdom and one in Bombay. Since 1946 the membership has grown from 120 to a present figure of nearly 4,000, of which 500 represent members oversea.

In defining the professional interests of its members the institution recognises that the term 'plant engineer' covers a wide range of people and functions and has framed its membership requirements so that applicants with modest academic qualifications are not necessarily excluded. This has been done in the belief that many such men have, over the years, amassed a considerable store of experience and expertise and are thus able to make an invaluable contribution to industrial efficiency.

Because it is recognized that increasing mechanization has greatly extended the responsibility and competence demanded of the plant engineer, the institution has paid much attention to education and training. It took a major part in the establishment of the City and Guilds course in plant engineering and or refresher courses held at various industrial centres for senior works and plant engineers.

'Dumbo' Self-erecting Hopper

As a result of an agreement recently negotiated between Amalgamated Limestone Corporation, Ltd., the manufacturers and patentees of the 'Dumbo' self-erecting hopper for bulk cement and powder materials, Abelson & Co. (Engineers), Ltd., in association with the manufacturers, have now become distributors for 'Dumbo' hoppers in England, Scotland and Wales.

Since 'Dumbo' hoppers were introduced to civil engineering contractors and industrial undertakings some years ago, the demand has steadily grown, and 'Dumbos' have become extensively used in an ever-widening range of applications.

The 'Dumbo' is manufactured in various sizes, and incorporates a number of exclusive features, including the patented one-man operated hand winch and cam method of on and off loading, which allows the 'Dumbo' to be unloaded from a vehicle and be erected without any mechanical aid, by one man, in a few minutes.

The left-hand, right-hand or twin dispenser units provide for a wide radius of discharge and an extensive area of operation so that, if necessary, two mixers can be fed simultaneously. Furthermore, the alternative method of dispenser mounting allows the 'Dumbo' hopper to be efficiently integrated with any type of mixing layout, large or small. A high degree of cleanliness is obtained by the filter design which eliminates wastage during charging. From their Sheldon Works, Abelson & Co. (Engineers), Ltd., of Birmingham, have a range of 'Dumbos' available for hire with immediate delivery, in addition to the normal sales and service facilities.

£39,000 Ghana Contract for Frederick Parker, Ltd.

Contracts worth £39,000 for a 30 tons/hr stone-crushing, screening and storage plant and a 'Starmix' 40 asphalt plant with outputs of 50 to 90 tons/hr, have been placed with Frederick Parker, Ltd., of Leicester, England.

The contracts were placed in London for an Accra firm, the Ghana National Construction Co., Ltd., and the equipment is to be used for airport resurfacing.

Management Training

A varied range of courses for management training, to take place during the first half of 1959, has been announced by Management Training (P.E.), Ltd. Details are available from the company's training centre at 12 Grosvenor Place, London, S.W.1.

Change of Address

Moxey, Ltd., are now at 123 Victoria Street, London, S.W.1.

Chaseside Merger with British Northrop, Ltd.

In order to ensure an economical price and a practical delivery period for the latest range of Chaseside construction equipment which includes the Loadmaster 3000 claimed to be the first 'giant' British-built and designed four-wheel drive loading shovel in its class, Chaseside Engineering Co., Ltd., have decided to take advantage, by merger with British Northrop, Ltd., of modern and large resources ideally suited to their joint development. For over a quarter of a century Chaseside have manufactured loading shovels, dumpers and allied equipment as a family business and they will continue to retain their identity and purpose under the present managing director Gordon L. G. Jackson. He is the elder son of G. H. Jackson, who resigns as chairman into a well-earned retirement. Gordon L. G. Jackson who also becomes managing director of British Northrop, Ltd., states that the new and larger machines will be manufactured at Blackburn and the present established range of Loadmasters will continue to be produced in large quantities at Hertford.

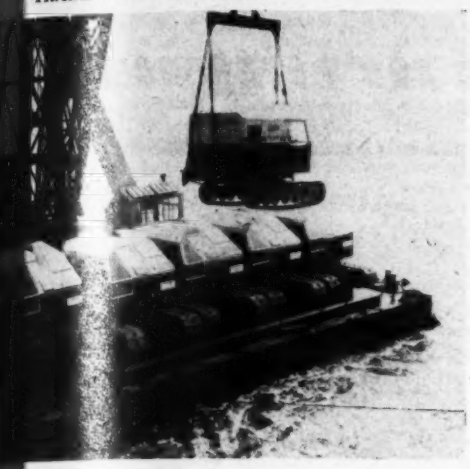
£1½-million Tube Contracts for TI

TI (Export), Ltd., the Tube Investments export organization, announces that contracts for steel tubes exceeding £1½-million in value have now been received from the China National Metals Import Corporation.

(*continued on page 119*)

This picture shows eight Lansing Bagnall SOES stillage trucks, of 3 tons capacity—the first part of a large export order for industrial trucks which the company is supplying to Pakistan. These first trucks were consigned to the Port of Chittagong in East Pakistan, which is undergoing some extensive developments in which mechanized materials handling methods will be introduced on a large scale

ABOVE
The Dumbo self-erecting hopper (seen here) is now distributed by Abelson & Co. (Engineers), Ltd.



LEFT:
Quick delivery: this picture shows part of a £112,000 export consignment of Ruston Bucyrus excavators for which the order was received, in the case of most of the machines, only a few days before the loading date. Thirteen excavators were shipped as one consignment to the company's Swedish distributors, Tornborg and Lundberg. The loading brokers were John Good & Sons, Ltd., of Hull, by whose courtesy this illustration is reproduced

Stein Atkinson Vickers Hydraulics, Ltd.
This company of 197 Knightsbridge, London, S.W.7, have opened a new branch office at 229 Royal Exchange, Manchester, 2. Telephone No. Blackfriars 0035.

Mr. A. R. Clayton has been appointed technical representative in charge of the new office. Branch offices are already established at Birmingham and Glasgow.

New Courses for Computer Users
Two forthcoming courses for present and potential computer users are announced by Urwick Diebold, Ltd., the recently formed British firm of data processing consultants.

One of them is the first British course to concentrate on a single application of automatic data processing—'Using ADP for Production Planning and Inventory Control'. It will thoroughly cover what a computer can and cannot do in this field. It is designed for production executives such as plant managers, and also for ADP and systems executives. It will be held in London from March 2nd to 6th, 1959.

The other course, entitled 'How to Manage and Control ADP', is the basic Diebold course covering all phases of planning, installing and controlling an ADP system with or without the use of computers. It was held under British Institute of Management auspices last January and attracted more than 70 senior executives and much press interest. This year it will incorporate new British material. It is designed for managers, controllers, senior executives, ADP managers, and systems and methods men. It will be held in London from February 9th to 13th.

Application forms and full syllabuses can be had from Urwick Diebold, Ltd., 29 Hertford Street, London, W.1.

BTR Industries, Ltd., Acquires Microcell, Ltd.
The board of BTR Industries, Ltd., announce that an agreement has been reached in principle whereby the company acquires the whole of the capital of Microcell, Ltd., and of the associated companies, Glass Yarns and Deeside Fabrics, Ltd., and Artrite Resins, Ltd. Mr. Henry Kremer, chairman and managing director of Microcell, Ltd., will continue in that capacity and will join the board of BTR Industries, Ltd.

Microcell, Ltd., whose main factories are at Camberley and Blackwater, Surrey, in addition to being engaged on important Government work, operate three main manufacturing divisions, namely, aircraft engineering, plastics and electronics, all of which the board of BTR Industries, Ltd., consider fit into the general development pattern of the BTR Group and afford scope for profitable growth in the future in both the home and overseas markets.

PUBLICATIONS RECEIVED

Aveling-Barford Group
The Aveling-Barford Group of companies, with headquarters at Grantham, have issued new publications as follows: 'What we Make', a brochure describing the activities of the group; a leaflet on 'The Super MG Grader'; and two leaflets dealing with their SN 27-ton dumper.

Hyster Co.
The second issue for 1958 of 'Space' published by The Hyster Co., of Portland Oregon, U.S.A., has just been received and contains among other articles an illustrated feature under the title, 'Key to Palletless Handling', depicting a number of different attachments enabling loads to be handled by fork truck without the aid of pallets.

Link-Belt Company
The above company, of 233 Broadway, New York, 7, N.Y., U.S.A., has issued a very comprehensive 64-page catalogue of equipment for the cane-sugar industry which depicts a wide variety of conveyors, granulators, etc., and ancillary equipment such as conveyor idlers, sprockets, and drive units. Also received from this company is the October-November issue of 'Link-Belt News' which contains a number of interesting articles on the use of Link-Belt handling equipment.

Lang Pneumatic, Ltd.
The above company, of Victory Works, Birmingham Road, Wolverhampton, have issued leaflets dealing with the following new products: ¼-in B.S.P. 2-way and 3-way air-operated poppet valves; ¼-in B.S.P. 2-way and 3-way solenoid-operated poppet valves; and an air gun.

John Allen & Sons (Oxford), Ltd.
The Christmas, 1958, issue of 'Allen's Activities,' published by the Allen Companies of Oxford, includes a number of interesting articles, including one on their K64 truck-mounted crane/excavator.

Dunlop Rubber Co., Ltd.
A new booklet on roller coverings has been published by The Dunlop Rubber Co., Ltd., General Rubber Goods Division, Cambridge Street, Manchester, 1.

International Harvester Co.
A new 12-page catalogue on the BTD-20 diesel crawler tractor has been issued by the above company, of Harvester House, 259 City Road, London, E.C.1.

Priestman Brothers, Ltd.
An illustrated booklet 'Priestman Progress' published by the above company, of Holderness Engineering Works, Hull, tells the story of the company's progress from 1870 until 1958.

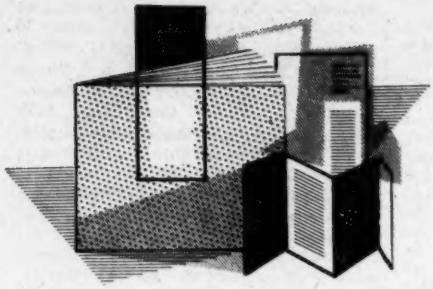
Herbert Morris, Ltd.
Morris mechanical handling equipment is described and illustrated in a 64-page publication from Herbert Morris, Ltd., Loughborough.

George Angus & Co., Ltd.
A leaflet dealing with the above company's facilities for the cutting of straight-toothed bevel gears has been published by their Gear Division, Prince Consort Rd., Hebburn, Co. Durham.

The Northern Region Engineering Buyers Guide, 1958-9, is now available, price 2s. 6d., post free, from The North-East Engineering Bureau, 18 Ridley Place, Newcastle upon Tyne, 1.

Incandescent Heat Co., Ltd.
A new leaflet dealing with Incanite, special process cast iron has been issued by the above company, of Cornwall Road, Smethwick, Birmingham.

Bowmaker (Plant), Ltd.
The autumn 1958 issue of 'Bowplant', house magazine of the above company, of Noose Lane, Willenhall, gives news of many of the company's activities.



ABSTRACTS AND REFERENCES

Articles on mechanical handling published in all technical and industrial journals of the world are indexed and abstracted below. Whenever it is known, the published price of the journal containing the article is given.

The addresses of the publications concerned are given and applications for copies of the journals mentioned should be made direct.

PNEUMATIC BRAKING SYSTEMS

Il Commando della Frenatura dei Veicoli Industriali. By Paolo Negri. *Trasporti Industriali*, Via Mantegna 6, Milan, Italy. September-October 1958. Pp. 902-905. 600L (Italy), 900L (other countries).

In an article on the operation of pneumatic brakes for industrial vehicles, the author outlines the provisions of the new code of practice for such applications. He makes special mention of the difficulties encountered in the use of compressed air for operating brakes on trailers.

BUCKET-WHEEL LOADER FOR STOCK RECLAIMING

Der Schaufelradlader. By Kurt Kamm. *Fördern und Heben*, Bahnhofstrasse 61, Wiesbaden, Germany. December 1958. Pp. 709-716.

Stock-reclamation by means of a bucket-wheel loader based on the bucket-wheel machines used for dredging, is illustrated by several applications described in this article. The loader is lighter than the dredging equipment on which it was based, and has a reduced digging capacity. It is shown at work in stocking-out areas laid out in various ways, mounted on tracks and running on rails, and operating in conjunction with conveyors.

FRENCH MECHANICAL HANDLING EXHIBITION

Compte-rendu du Salon; Vu au Salon. *Manutention*, 40 Rue du Colisée, Paris 8, France. December 1958. 40 pages. 400 fr (France) 500 fr (countries outside France).

Most of the December issue of *Manutention* is devoted to a report of the seventh mechanical handling exhibition to be held in Paris. More than 300 exhibitors participated, and Britain, America, and several continental countries were represented. A 26-page stand-by-stand review is followed by a 14-page article on new products of special interest.

Industrial trucks are well represented, including hand trucks and fork lift and other powered types, and there are some examples of machines provided with alternative equipment for picking up and transporting various classes of materials. Pallets and containers, overhead and floor-mounted conveyors, and mobile cranes and grabs, are among the other principal categories of equipment.

ACCIDENT ANALYSIS

Safety in Materials Handling. By J. L. Eckebrecht. *Materials Handling*, 2 Bloor Street East, Toronto 5, Ontario, Canada. December 1958. Pp. 15-21.

In an article based on a talk given to the Industrial Accident Prevention Association, at Toronto, the author analyses the principal causes of industrial accidents as recorded in the I.A.P.A. figures for 1957.

These figures show that out of a total of 96 fatal accidents occurring during that year, 38 were associated with materials handling. Further analysis revealed that 29·5 per cent of these accidents occurred when the materials were being handled manually. Of the remainder, many were due to bad and uneven floor-surfaces. Another frequent cause of minor accidents was the bad loading, and the overloading, of hand-trucks.

STANDARD AMERICAN HAND-TRUCK

Association Puts Seal on Ideal Platform Cart. *Distribution Age*, Chestnut and 56th Streets, Philadelphia 39, Pa., U.S.A. December 1958. Pp. 42-43 and 58. 50 c.

A standard hand-truck, with fixed platform, mounted on two rigid and two swivelling castors, has been specified by the Caster and Floor Truck Manufacturers' Association of America. Designed for use with or without a standard trailer, the truck, which is known as a 'platform cart', is described in detail in this article, with full dimensions, load ratings, and particulars of the wheels and tyres. These trucks are suitable for hand propulsion or for attachment to underfloor or overhead conveyors.

ITALIAN SAFETY CONFERENCE

Convegno Nazionale sulla Sicurezza del Lavoro nei Trasporti Aziendali. *Trasporti Industriali*, Via Mantegna 6, Milan, Italy. September-October 1958. Pp. 916-922. 600L. (Italy), 900L. (other countries).

Contributions to the discussions and the concluding motion, at the Turin conference on industrial safety are summarized in a report.

HYDRAULIC CONTROL SYSTEMS

Inherent Non-linear Effects in Hydraulic Control Systems with Inertia Loading. By J. K. Royle. Institution of Mechanical Engineers, 1 Birdcage Walk, London, S.W.1. Advance copy 13/58.

The effects of an external load, particularly an inertia load, on a pilot valve and ram system are considered by the author. In such a system, which is typical of those used in the majority of hydraulic remote-control arrangements, and particularly for position controllers, the pilot valve is used to provide an oil-flow proportional to valve-displacement. The ideal system assumes zero load on the ram or motor for calculating the linear dynamical performance. In practical systems, the load on the ram or motor causes pressure-changes that invalidate this basic linear assumption.

The Response of a Loaded Hydraulic Servomechanism. By D. E. Turnbull. Institution of Mechanical Engineers, 1 Birdcage Walk, London, S.W.1. Advance Copy 13/58.

Some of the more important non-linearities introduced when single-stage hydraulic systems are loaded have been examined by the author of this paper. These include those classifiable as loads induced by friction, those proportional to the displacement of a spring, viscous loads dependent on velocity; those proportional to the square of velocity, resulting from the introduction of an orifice or dashpot; and inertial loads.

STOCK CONTROL

Cenni di Soluzione ad Alcuni Problemi di Organissione Amministrative dei Magazzini. By Carlo Chiglieno and Giancarlo Giannelli. *Trasporti Industriali*, Via Mantegna 6, Milan, Italy. September-October 1958. Pp. 906-910. 600L. (Italy), 900L. (other countries).

Materials classification and inventory methods are examined with particular attention, in this account of the stock-control arrangements employed in a warehouse in Italy. Some 30,000 different items are handled in the warehouses of the mechanical engineering firm under review.

ACCIDENTS TO MOBILE CRANES

Overturning of Mobile Cranes. *Vulcan*, The Vulcan Boiler & General Insurance Co., Ltd., 67 King Street, Manchester 2. October 1958. Pp. 44-45.

Two accidents involving the overturning of mobile cranes are described, in each of which the machine was used for cargo handling. In the first, a 7-ton slewing machine engaged on loading operations at a quayside, was standing on an inclined surface. When the solenoid-operated slewing brake was released the superstructure swung outward and the crane tippled over into the water. In the second incident, the driver accidentally started up the engine with the gear lever in reverse, in consequence of which the crane ran backwards and toppled over into a canal.

In both cases, the crane, which was mounted on pneumatic tyres, came to rest with its superstructure grounded on the bed of the waterway and its chassis resting on the quayside. Both cranes were recovered, and the costs of both accidents were met in full under a Vulcan insurance policy.

GRABBING BUCKET OR CONTAINER

Ein Halbes Jahrhundert Kübelwagen. By Erich Krome. *Fördern und Heben*, Bahnhofstrasse 61, Wiesbaden, Germany. December 1958. Pp. 717-721.

Improvements made during a period of more than 50 years in a convertible grabbing bucket are reviewed in this article. These buckets are mounted for transportation on modified railway chassis, and both bucket and chassis have been improved as the years went by. Both have

(*Continued on page* 121)

been strengthened, and the buckets have been protected from rust. The system is of especial value for the handling of coal, by providing reduced abrasion. It improves the turnround of rail wagons and is valued as a means of speeding up the loading of coal into ships and barges.

MECHANIZED LIMESTONE QUARRY
Crushing and Screening Plant at a Derbyshire Lime Works. By A. R. Sinclair and D. J. Murrells. *G.E.C. Journal.* Magnet House, Kingsway, London, W.C.2. October 1958. Pp. 189-192.

G.E.C. plant has recently been installed for the crushing and screening and mechanical handling of high-grade carboniferous limestone at Beswick's Lime Works, Ltd., near Buxton. The limestone is quarried in pieces of up to 2 cu. yd. volume and loaded by excavator into dump-trucks for transport to the processing plant, which handles a throughput up to 200 tons/hr.

An unusual arrangement is employed for discharging the material at the head of the crushing plant. The dumpers are fitted with side-tipping bodies, which are tilted to the tipping position by an arm raised by means of a stationary winch. The winch motor is operated by push-button controls mounted on a bracket within reach of the dump-truck cab, thus enabling the driver to pull up at the discharge position, reach out and press the button, and, when the load has been discharged, drive forward and away for reloading. It is stated that each dump-truck is enabled to maintain a sustained loading and unloading cycle of 3 or 4 min for the 12 ton load.

HANDLING IN THE EXTRACTIVE INDUSTRIES
Winning and Handling of Raw Material. *Fördern und Heben*, Bahnhofstrasse 61, Wiesbaden, Germany. Export number 1958-1959. Pp. 10-15.

Conveyors, transporters, excavators, dredgers, and other high-capacity plant for winning and handling coal, lignite and various ores, and for extracting gravel from rivers and large pits, are included in an illustrated review of representative installations. Of special interest are the excavators and conveyors used in the German lignite industry.

VEHICLE LOADING
Il Rapporto Esistente fra Traffico Industriale e Trasporti Interni. By Ezio Doriguzzi. *Trasporti Industriali*, Via Mantegna 6, Milan, Italy. September-October 1958. Pp. 898-901. 600L. (Italy) 900L. (other countries).

In an analysis, with costs, of the available alternative methods of co-ordinating internal and external transport, the author surveys some of the methods of loading and unloading vehicles and of bringing materials to and from the assembly areas.

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John Farrell. 15s. By post 16s. 1d.

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Edited by T. E. Ivall. 25s. By post 26s.

MATERIAL HANDLING IN WORKS STORES. Second Edition. The Fork-Lift Truck and Pallet System
L. J. Hoefkens. 18s. By post 19s.

PRINCIPLES OF MASS AND FLOW PRODUCTION
Frank G. Woollard, M.B.E., M.I. Mech.E., M.I.Prod.E., M.S.A.E. 25s. By post 26s. 4d.

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RECENT PATENTS

The following are brief extracts of recent United Kingdom patents which we believe will interest our readers. For full details the original patent specifications should be consulted at, or bought (3s. 6d. each) from, The Patents Office, Southampton Buildings, Chancery Lane, London, W.C.2.

WINCHES
Allmanna Svenska Elektriska AB, of Sweden—U.K. 800728.

Ships' winches with two or more cable drums on a common shaft, and axial moving clutch. Drive shaft can be enclosed, be worked in oil, and be of smaller width.

ELECTRIC CRANES
Officine Meccaniche Ruinite S.P.A., of Milan—U.K.800753.

A single handle control with a dead-man-type release handle is used.

WALKING BEAM
Svenska Metallverkers AB—U.K.800806.

Details of walking beam furnace conveyor with means to prevent scale from billets dropping through separation spaces—by use of a water seal and scraper to collect the detritus.

LIQUID TANKER
British Petroleum, Ltd.—U.K.800824.

Road tanker has flexible diaphragm dividing interior with resilient pads at base, so that dirty or clean loads can be carried either side of the 'bag' as required without cleaning.

PNEUMATIC CONVEYOR
Henry Simon, Ltd., of Stockport—U.K.800877.

Minimal leakage in cereal, cement, flour, sugar, pneumatic conveyor—without air locks, with a degree of impeller by-pass.

TRACK LAYING
Materiel Industriel S.A., of Lausanne—U.K. 800880.

Rail track is laid from single line by hoisting over wagons either side of a gap and laying this part as wagon proceeds along over it.

CAN CONVEYOR
Mather & Platt, Ltd., of Manchester—U.K. 801043.

A can rotator, from end to rolling position, using parallel belts at different speeds from feed belts.

ROLLER SUPPORT
Conveying Developments, Ltd., of Cardiff—U.K.801068.

Flexible roller support for conveyors, of simple trough form, with flexible sleeve and enclosed bearings.

GRANULE HEATER
Klochner Humboldt-Deutz A.G., of Cologne—U.K.801112.

Raw cement, to be heated by waste gas, is fed by pneumatic elevator, with controlled gravity-fall feed-avoiding bucket conveyors. The pneumatic elevator is fed from belt or screw conveyor via a hopper.

MULTI-PURPOSE VEHICLE
Etablissements Belingard, France—U.K.801141.

Self-propelled public works vehicle to take various tools, e.g. for use as dumper, crane, loader, elevator, sweeper, skimmer, etc.

LUMP LOADER
Licencia, T. E. Vallalal, Budapest—U.K.801153.

Transportable loader from lumpy piles. Of high output and able to work underground. Toothed star wheel feeds undercutting into pile, and scraper chain conveys material along chute to deposit.

PLATE CONVEYOR
Northern Dairy Engineers, Ltd.—U.K.801157.

This conveyor can traverse curves round pulleys at 90 deg, has no split-links and is easy to replace.

GRANULAR SPOUT
Henry Simon, Ltd., Stockport—U.K.801160.

Granule conveyor as patents 777178, 792256 but with replaceable connector sleeves on spout connector, held by a U-shaped ring.

PARCEL CARRIER
Grand Union Co., of New Jersey—U.K. 801164.

A form of wheeled parcel carrier, as used in supermarkets—light and nesting.

AUTOMATIC CONVEYING
A. & D. R. Freeman, of Kettering—U.K.801180.

A profiled card controls preselected load detachment for determined positions.

TUB TIPPLER
Butterley Co., of Derby—U.K.801259.

Mine coal car tippler, with vibrating joggling frame to prevent load stickage when inverted.

AERATED SOLIDS DELIVERY
Carl Schenke Maschinenfabrik G.m.b.H., of Darmstadt—U.K.801304.

Gush-tending fine solids are fed by a variety of means tending to deaerate them and give even flow on to conveyor. Powders drop into a hopper with automatic valve controlled level then feed via chain mats to agitate the dust and remove air, giving even flow.

SACK HOLDER
E. H. Bentall & Co., Ltd., Essex—U.K.801308.

Sack held in sliding horizontal bars under discharge chute and spout, for flour, etc., filling.

SHEET DELIVERY
Aetna Standard Engineering Co., Ltd., of Pittsburg—U.K.801371.

Improvement of 703998 for tinplate conveyed and fed according to thickness—initially at 1,000 f.p.m. slowed down to a tenth by using overlap feed via a shingling plate whose position is varied according to overall operating speed.

BAND CONVEYOR
Sovex, Ltd., of Erith Kent—U.K.801447.

Band or slat vertical conveyor for use with post office sacks, parcels, etc., with a flexible air-filled bag pressing load against steep angle entry and band.

CAN HANDLER
Emhart Manufacturing Co., Connecticut—U.K. 801454.

Rotary divider wheel accepting feed from a conveyed row of cans and feeding four or more by having the periphery giving off four or so cans at a time into divided lines.

BOTTLE CRATING
Matthew Wylie & Co., Ltd., of Glasgow—U.K. 801514.

Safer bottle crating using inclined crate conveyor fed with bottles in series of stepped stops as conveyor moves down.

COAL CUTTER CONVEYOR
Canadian Ingersoll Rand Co., Ltd., of Montreal—U.K.801539.

Self-propelled machine with large spiral flight with cutter at front and flight surfaces for removal of coal, backwards.

LOAD CLAMP
Yale & Towne Manufacturing Co., of New York—U.K.801552

Attachment for fork lift trucks to collect cartons, etc., without needing skids or pallets, with at least one resilient clamp in the arms.

BISCUIT HANDLER
Huntley & Palmers, Ltd.—U.K.801564.

Flat biscuit conveying in small stacks or layers. Biscuits deposited by tilting on to a continuous column.

SIFTER
Russell Constructions, Ltd., Adelphi—U.K. 801588.

A multi-level vibrating sieve with a given form of out-of-balance weight and suspension.

PACKAGE HANDLING
Package Stacker Inc., of Texas—U.K.801623.

An automatic floor stacker for lift use, can deal with two or more lines at once, under pneumatic power, controlled by package supports operated by their presence or deposition.

JOINTED PLATE SYSTEM
Gebr. Eickhoff Maschinenfabrik & Eisengiesserei M.b.H., of Bochum—U.K.801635.

Anti-friction rollers run on tracks with reduced wear and corrosion by having stub axles of die-forged clamp members.

PNEUMATIC FEED
Elyn Engineering Co., of Luton—U.K.801640.

Hopper feeding inlet duct to pneumatic conveyor, with form of venturi taper to overcome undue friction and turbulence.

DOUBLE CONVEYOR
Wean Equipment, Ltd.—U.K.801649.

A conveyor moves vertically and fits into a second without needing heavy supports.

TRANSFER DEVICE
Baker Perkins, Ltd., of Peterborough—U.K. 801650.

Transfer device for moving automatically tin bakery containers, without damage to contents, to second conveyor at different level.

MATCH SPLINT FEED
N. V. Inland, of Rotterdam—U.K.801696.

Rotary device for rapid feeding of match splints to holes in a conveyor.

CRATES
Packman Machinery, Ltd., of Twyford—U.K. 801745.

A form of hinged-end wall crate mounted on rollers for delivery of a load from van which can hold several such crates.

BELT IDLER
Kennedy Van Saun Manfg. & Eng. Corpn., of New York—U.K.801814.

A form of idler made from metal sheet with integrally joined welded ends.

CONVEYOR TRACK
Geo. W. King, of Stevenage—U.K.801898.

Drive control for overhead trolley track with retractable abutment.

FILTER FEED
American Machine & Foundry Co., of New York—U.K.801962.

A feed and cutter machine for cigarette mouthpiece filters giving uniform lengths, using a rotating wheel with peripheral holes taking cylinder and severing portions at intervals during rotation.

TRENCH DIGGER
Etablissements Matenin, Paris—U.K.802227.

An endless bucket or scraper chain device, with easy adjustment to slope and depositing muck both sides.

LINE HANDLER
Mattews Conveyor Co., Ontario—U.K.802228.

Same conveyor belt can be used for one or two lines of different sized packages by using an assembler giving paired groups of smaller ones, e.g. beer cartons.

HATCH HOOD
E. A. Sjoeman, Finland—U.K.802234.

Easily erected plastic hood fitting over ships' hatches, etc., but not too inconvenient in use as a protection from rain, etc.

SCRAPER GUIDES
Halbocbe Braun, Essen—U.K.802235.

Improved version of patent 790189 with the scraper guide rails in a trough, projecting from sides with notches of the plates fitting into them.

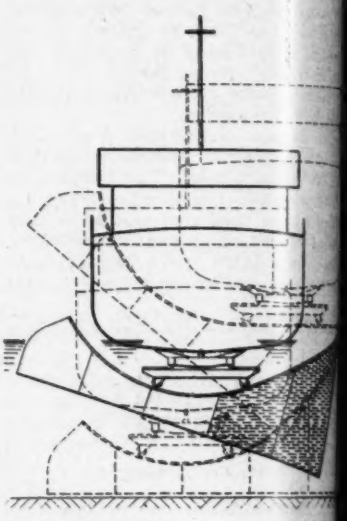
STEEL BELT SYSTEMS
Sandvikens Jernverks A.B., of Sweden—U.K. 802243.

Superior forms of pulley belt drive for steel-plate conveyors.

MINE CAR HANDLER
Qualter Hall & Co. Sales, Ltd., Barnsley—U.K. 802279.

Beam members sliding in fixed guides replace creepers for moving tubs, etc., to tipplers or cage.

Ship raising and lowering device—U.K.802210



SHIP HANDLING
VEB Volkswerft Stralsund, of East Germany—U.K.802314.

Ship lift device which can replace dry docks, and comprises a pivoted arm carrying rails for slipway trucks holding the ship, with floodable chambers, and able to carry the ship up to ground level.

CONVEYOR TENSIONING
A. G. Wild & Co., Ltd., of Sheffield—U.K.802[illegible]

Scraper chain or flight bar armoured conveyors, and the replacement of sections by means of a tensioning device comprising a hydraulic jack and bracket.

OVERLOAD CONTROL
Mavor & Coulson, Ltd., Glasgow—U.K.802[illegible]

Time-limit overload switch protects underground conveyors. Over stretch is likewise controlled by micro-switch contacts.

CONVEYOR CONTROL
South Eastern Gas Board, Croydon—U.K.802[illegible]

Coal on a conveyor belt is sprayed with oil before reaching a gas retort house hopper, with a weight-operated cut-out stopping oil supply if no coal is present—detected by an idler wheel sensitive to deflection.

NEWSPAPER CONVEYOR
Igranic Electric Co., Ltd., of Bedford—U.K. 804665.

Improvement on patent 781652 for conveying and counting streams of newspapers, which can overlap, using photocells and a double wire conveyor belt.